Analysis of Early Military Attrition Behavior

Richard Buddin

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This study

Analyzes the influence of preservice
experiences and initial military job match
on military attrition of first-term
enlisted males during their first six
months of service (early attrition). The
dynamics of attrition behavior are examined
in terms of recent firm-specific human
capital and job matching models. The
determinants of early attrition are
compared across services and with those of
civilian job separations of young workers.
Some of the conclusions drawn are:
enlistees with a history of frequent
civilian job changes or a recent spell of
unemployment are attrition-prone; aspects
of the initial military occupational
assignment like individual suitability and
satisfaction do not significantly influence
early attrition; the early attrition rate
of nonhigh-school graduates is nearly twice
that of graduates even after controlling
for previous work experiences, ptitude,
and other variables that influence
attrition; and older recruits are more
attrition-prone than younger recruits.

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Analysis of Early Military Attrition Behavior

Richard Buddin

July 1984

Prepared for the
Office of the Assistant Secretary of Defense/
Manpower, Installations and Logistics

PREFACE

During the past decade, a third of the first-term enlistees in each of the military services have failed to complete their enlistment terms. These attrition rates imply increased costs and policy adjustments throughout the military manpower system. The effects of such high attrition pervade recruiting, training, force readiness, and, ultimately retention policies. This report examines the behavior of first-term enlisted males during their first six months of military service. This period was chosen not only because 10 percent of all non-prior service enlistees leave during this initial transition to military life, but also because of a belief that factors influencing the early attrition may differ substantially from factors influencing later (post-training) attrition. The findings shed light on high-attrition-risk individuals and should be of interest to civilian as well as military personnel officers.

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SUMMARY

In this study, a multivariate model is created to explain the early attrition process; it is designed to assess the contribution of demographic background, prior experience, job match and satisfaction, entry point decisions, alternatives to the military, and socioeconomic factors to early attrition of enlisted males. The framework was based on recent firm-specific human capital and job matching models that analyze the dynamics of job separation. Comparisons are drawn between the determinants of early military attrition and civilian job separations of young workers, and the effects of various factors are also compared across services. Finally, this research relates the analysis of early attrition to previous research on post-training attrition and attrition over the entire first term.

The analysis is based on a matched file containing the 1979 Survey of Personnel Entering Active Duty (the AFEES survey) and the Services' Enlisted Master and Loss files. The unique aspect of the AFEES data is the richness of information available for analysis of first-term enlisted attrition. The survey contains much more systematic information on individual background factors and motivations at the time of enlistment than is available in the personnel files maintained by the services and DoD. The more detailed background information available in the AFEES helps fill two gaps in previous attrition research. First, the new variables illuminate the underlying behavioral relationships between demographic characteristics and attrition. Second, new information on recruit work history, on aspects of the military job match, and on job satisfaction provides insights about which individuals are high attrition risks and makes the analysis of early attrition more comparable to studies of job separations by young civilian employees.

The analysis of overall early attrition for all services combined suggests the following:

- The work history of recruits before enlistment has an important bearing on early attrition. A spell of unemployment in the year before enlistment increases separation rates by 2.2 percent. Recruits who change jobs frequently before enlistment are more prone to early attrition. Other things equal, a 19-year-old recruit with four previous employers has a predicted separation rate of 12.7 percent compared with 9.6 percent for a recruit with a single previous employer.

- Various indicators of military job match had no significant impact on early attrition. Factors like not qualifying for the desired kind of job, having pre-enlistment knowledge of job qualifications, or getting the job they preferred do not alter the likelihood of early attrition after controlling f∕r other variables in the multivariate model. More general measures of job suitability, like satisfaction with the military job or even with the military itself, also had little influence on early separation.
- The early attrition rates of non-high school graduates and recruits with a graduate equivalence diploma are 8 percentage points higher than the rates of high school graduates. Although this result is consistent with prior attrition research, the AFEES database can account for many previously unobserved variables, like work history and poor job matches, which might have distorted the impact of high school graduation status on attrition. Although some of these new variables help to explain early attrition, they do not diminish the importance of high school graduation status in explaining early attrition.
- After controlling for other factors, older recruits are more attrition-prone than younger recruits. Early attrition *increases* about 1 percentage point per year for each year beyond age 17 at enlistment.

How do the determinants of early military attrition and civilian separations of young workers compare? Work history, general aptitude, and minority status have similar impacts in both types of separations. There are, however, three factors that have quite different effects on the two groups. Age is directly related to early attrition but inversely related to civilian separations. Lack of education has a more significant and more pronounced negative impact on early attrition than on civilian separations. Finally, job dissatisfaction is consistently linked with civilian separation, but differences in job satisfaction (as measured on enlistment day) have no significant impact on the likelihood of early separation. These differences between the determinants of early attrition and civilian separations of young workers may reflect both institutional differences between the two sectors and differences in the individuals who choose employment in each.

In general, most factors have a similar influence on early attrition in all services. Blacks and Hispanics have lower early attrition rates than white non-Hispanics in all services, although the effect is significant only in the Army. AFQT has a statistically significant but quantitatively small negative influence in each service. High school diploma graduates are markedly more likely to survive the first six months than

dropouts. While early attrition does not vary significantly by age in the Air Force, early attrition increases about 1, 2, and 4 percentage points *per year* with enlistment age beyond 17 in the Army, Navy, and Marines, respectively. Neither job satisfaction nor overall military satisfaction at the time of enlistment has a significant impact on early attrition in any service branch.

Variables characterizing prior work experience before enlistment have a qualitatively similar impact on early attrition in all services, although the magnitude and significance of the effects vary somewhat. Differences in work history before enlistment are significant predictors of early attrition in the Army, Navy, and Air Force. Navy and Air Force recruits with a spell of unemployment in the year preceding enlistment are 4 to 5 percentage points more likely to leave during the first six months. An extra job change for a 19-year-old recruit in the Army or Air Force enhances his chances of early separation by 1.7 and 1.5 percentage points, respectively.

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I. INTRODUCTION

High levels of first-term enlisted attrition have concerned military manpower planners for several years. All the military services currently lose approximately 30 percent of each entering cohort before the completion of three years of service. The largest loss rate occurs during the first six months, when over 10 percent of the entering cohort is discharged. This research examines attrition of male enlistees during this initial transition to military life. Focus on early attrition reflects both the large share of first-term losses that occurs during this period and a suspicion that factors influencing attrition behavior during the initial training period may differ substantially from factors influencing later (post-training) attrition.

This study assesses how background characteristics, prior work experience, and satisfaction with initial military job assignment influence attrition losses during the first six months of service. Another important feature of this research is an interservice comparison of factors underlying early attrition by applying a similar analytic technique to each service. Virtually all previous research has focused on a single service (see Sinaiko et al., 1981, for examples and references), and interservice comparisons have been complicated by differences in regression specifications and sample selection criteria. Finally, this research compares and contrasts the determinants of early attrition with those of civilian job separations by young workers. Although military employment may differ from civilian employment in some respects, one would expect that many factors would have a similar impact on the probability of job separation in both sectors. A comparison of military and civilian separation behavior can reveal whether early enlisted attrition rates are endemic to military institutions themselves or are inherent in the military's reliance on young, inexperienced individuals.

The analysis is based on a matched file containing the 1979 Survey of Personnel Entering Active Duty (the AFEES survey) and the Services' Enlisted Master and Loss Files. The AFEES survey collected detailed information at the time of enlistment on the recruit's educational and work background, his enlistment decision, his military job assignment, and his expectations for military life. The matched Enlisted Files are a record of recruit service experiences (training, duty assignment, specialty, etc.); they allow us to track a recruit throughout

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his military career from enlistment to attrition or to the end of the enlisted term.

The richness of the AFEES data allows for a more complete analysis of those factors influencing attrition than was possible in previous studies. New types of issues are considered. Does prior work experience provide any insight into the likelihood of early attrition? Is job satisfaction or the quality of the job match an important factor in early attrition? Why do high school dropouts have such high attrition rates? Are dropouts more sensitive to previously unobserved variables (like work history or poor job matches) than graduates? The answers to such questions enhance understanding of early attrition and allow the services to more accurately identify attrition-prone recruits. Furthermore, with this database, we can examine whether characteristics that influence civilian job separations have a similar impact on military attrition.

The next section of the report provides a framework for analysis of early attrition. This framework is an outgrowth of economic models of civilian job separation and facilitates comparisons between military and civilian separations of young workers. Section III describes the merged AFEES file used in the analysis, defines the analysis variables, and offers an overview description of the simple relationship between several key variables and early attrition. Section IV reports the empirical results for a multivariate model of early attrition behavior. Comparisons are drawn across services and between military and civilian separations. The final section offers conclusions and directions for future research.

II. ANALYTIC FRAMEWORK

What factors influence job separations? Why do these factors matter? What policies will alter separation behavior? Traditionally, research on military attrition has approached these questions independently of research on civilian job separations. The distinction is unfortunate because of the strong conceptual similarities between the two types of separations. Young workers choose among competing alternatives for employment: The military competes with other employers in contracting labor services. Civilian workers may separate from civilian jobs and enlist in the military.[1] Similarly, recruits who are discharged early from the military presumably obtain civilian employment.

This section develops a common framework to examine military attrition and civilian separations. The framework provides several guiding hypotheses that suggest how and why various individual characteristics will influence separation behavior in each sector. These hypotheses relate to variables traditionally used in attrition research as well as newly available variables from the AFEES survey. Some differences between the determinants of civilian and military separations are expected because of unique and inherent characteristics of military employment. Other differences may suggest areas for policy adjustment.

QUITS VERSUS FIRES

The premise underlying economic models of job separations is that the employer or employee anticipates that a separation will enhance his well-being. For the employee, if the discounted present value of pecuniary and non-pecuniary benefits (i.e., the value of these benefits adjusted for factors like inflation) associated with the current job is less than that of an alternative job, then he will initiate a separation, i.e.,

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[1]Most new recruits are employed at the time of enlistment, so enlistment choice should be considered in the context of a job separation. In this context, job separation models could provide insights into the determinants of enlistment behavior and the effectiveness of alternative recruitment strategies. We are not aware of any accession or enlistment choice model that considers implications of firm-specific human capital or job matching theories on the enlistment decision. Characteristics that reduce the likelihood of job separation should reduce the likelihood of employed individuals enlisting, since enlistment presumes a job separation. This section discusses the implications of separation models for predicting military attrition but does not elaborate on their implications for military enlistment. The latter issue is beyond the scope of the current research.

$$q_{it} = g(y_{it}' - y_{it}) \tag{1}$$

where q_{it} is the probability of an individual quitting a job i with t years of tenure, y' is the discounted present value of the expected alternative income stream, and y is the discounted present value of the income stream of the current job for a worker with t years of tenure. Similarly, the employer will lay off (either permanently or temporarily) workers whose wage rates exceed their marginal revenue product (MRP). Thus,

$$l_{it} = h(MRP_{it} - w_{it}) \tag{2}$$

where l_{it} is the probability of a worker with t years of tenure being laid off a job i, MRP_{it} is the marginal revenue product of the worker, and w_{it} is the wage rate. A direct result of the initial premise then is that employment contracts, i.e., formal or informal working agreements between employers and employees, must enhance the well-being of each party. Workers will take those jobs they believe offer the best benefits, and firms will hire those workers whose productivity per unit cost is greatest so that the differences in Eqs. (1) and (2) are presumably non-negative for $t = 0$.

The apparent distinction between quits and fires implied by Eqs. (1) and (2) may have little theoretical or empirical importance. If the joint wealth of the employer and employee is reduced by separation, then one party can compensate the other and preclude separation. From this perspective, separation occurs only when the combined wealth associated with ending the employment contract exceeds the combined wealth associated with continuing it.[2] Consider, for example, the situation where product price falls in the jth firm. The firm might respond by "firing" workers because MRP is lower than their wage rate. Alternatively, the firm could reduce wages in light of the new situation, and workers would leave, if possible, for better alternatives. At some reduced wage, the firm would be willing to retain the worker, but the worker would not agree to stay. Since both the cause (reduced product price) and the effect (job separation) are identical, the distinction between the two cases becomes one of semantics.

The traditional distinction between quits and fires is also suspect because of differential costs and benefits associated with the different kinds of separation. Dissatisfied employees have an incentive to induce "firing" because unemployment insurance is frequently not available to workers who quit. On the other hand, firms may

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[2]This type of argument is supported by Becker et al. (1977), Jovanovic (1979a), Mortensen (1978), and Bartel and Borjas (1977).

encourage undesirable workers to quit because a firm's contributions to state unemploymen insurance plans is an increasing function of its involuntary separation rate. As a result, distinctions between quits and fires in civilian analyses may be misleading, and many recent microlevel studies of job separations (Bartel, 1980; Mincer and Jovanovic, 1982; Viscusi, 1980) have not distinguished between them. In an empirical study, Bartel and Borjas (1977) formulated separate equations for different kinds of job separations. They found that the qualitative and quantitative results were insensitive to the distinction between quits and fires for workers with less than three years of tenure.

This analysis of early attrition does not distinguish between voluntary and involuntary separations. The conceptual differences are ambiguous, and the empirical ones are confounded by service policy that precludes "quits." Service contracts are formally binding until the end of the enlistment term. Dissatisfied recruits can set up certain conditions and situations that induce discharge, but then determining the party initiating the separation is not clear.

Because employment contracts are initially satisfactory to both parties, a separation implies that some aspect of the initial situation has changed. Existing job separation models differ primarily according to the nature of those changes that induce dissatisfaction with the initial employment contract.[3] Two types of models have been applied to permanent civilian job separations: a firm-specific human capital one, and a job matching one. Each model offers insights into the relationship between separations and various individual characteristics for both civilian and military personnel.

FIRM-SPECIFIC HUMAN CAPITAL AND JOB SEPARATIONS

Firm-specific human capital models assume that special, unique skills are acquired during employment at a given job. Although individuals learn many skills from job experience, some special skills are

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[3]A large number of models (Feldstein, 1975; Pearce, 1980; Topel, 1982) analyze the determinants of temporary job separations induced by cyclical and noncyclical shifts in product demands. In these models, the probability of layoff is inversely related to the size of the fixed cost investment in the worker. These models are not considered here for three reasons. First, military demand for labor has not shifted substantially in recent years. Second, small changes in requirements can readily be met by altering recruitment requirements, so that military "layoffs" are really nonexistent. Finally, since this study analyzes attrition during a six-month time period, the services are not likely to have altered substantially their demand for labor in such a short period.

tied to the specific job with the firm, and the worker cannot transfer these *firm-specific* skills to another employer by changing jobs. Such firm-specific skills are valuable to the employer. Job separations by employees with firm-specific skills will impose retraining costs on firms. As a result, firms pay individuals with these skills a wage premium to discourage employee separations. Firm-specific human capital investment implies

$$MRP > w > w_a \tag{3}$$

where w_a is the employee's alternative wage at another firm (which does not pay more for those firm-specific skills). $MRP - w$ is the firm return on investments in worker training, and $w - w_a$ is the premium paid workers for acquiring firm-specific human capital. The separation rate is affected by the total returns to specific investments $MRP - w_a$. The larger this number is, the more incentives the firm will have to offer larger wage premiums to forgo the investment loss associated with job separation.

Firm-specific investments have a cumulative effect over time, i.e., more knowledge of job-specific skills is acquired with job experience. As investments grow over time, $MRP - w_a$ increases, the wage premium increases, and the probability of separation declines. Thus, the theory predicts that firm experience (tenure) has a negative effect on separations. This result is a simple consequence of wage growth associated with the investment pattern in firm-specific skills.

Job tenure is not the only variable influencing firm-specific capital investments. Individuals have different tastes for skill acquisition and different opportunities. Better educated or more able individuals *may* have better opportunities and accumulate firm-specific skill more rapidly. If so, at a given level of tenure, the probability of separation would be lower for better educated or more able workers than for average workers.

These individual differences in investment behavior imply heterogeneity in job separation, which distorts estimates of true tenure effects on separation. The effect of this heterogeneity on estimated tenure effects is easily demonstrated. Consider the hazard function for a high-investment (say, well-educated) group and low-investment group. The hazard function gives the probability of leaving a job in period t conditional on having worked at the job for $t - 1$ periods. The theory implies that the low-investment tenure profile will be higher and flatter than the high-investment profile, i.e., at a given level of tenure, the separation probability is greater in the low-investment group and as tenure increases the gap broadens. Next, suppose the tenure profile is

estimated without controlling for heterogeneity. Since separations in the firm-specific low-investment group typically occur at low tenure relative to separations in the high-investment group, the estimated profile is inappropriately steep, i.e., separation rates are overpredicted for low levels of tenure and underpredicted for high levels of tenure. This bias can be corrected by controlling for heterogeneity and estimating separate profiles for the low- and high-investment group, provided such groups can be reliably defined.

The firm-specific human capital hypothesis suggests that job separation is a function of job tenure, individual and firm characteristics, and investments in firm-specific human capital. Characteristics like education, age, race, family status, health status, experience, and industry are included in separation regressions as heterogeneity controls. Inclusion of these variables reduces the bias in the estimated tenure profile.[4] The coefficients of these variables also provide insights into the pattern of firm-specific investments. For example, education and total years of work experience are associated with accumulated work skills and higher wages, but these general skills will increase current wages and alternative wages proportionately and *not alter* the separation rate. The theory predicts that general skills like education influence separations *only* if these skills are complementary with firm-specific capital investments.

An alternative method of controlling heterogeneity has been proposed by Mincer and Jovanovic (1982). Their model assumes that given a certain tenure level, all members of a homogeneous group will have equal separation probabilities, whereas members of a heterogeneous group will have different separation probabilities. A variable indicating the frequency of past moves is used as a proxy for the individual propensity to move, and controlling for past moves helps correct the heterogeneity bias in the tenure effect. The significance of the regression coefficient for frequency of past moves indicates the presence of heterogeneity from individual differences in firm-specific human capital investment. A similar argument suggests that a measure of unemployment history or spells of unemployment could be a proxy for another source of heterogeneity, because the unemployment is typically associated with job separation.

To summarize, the firm-specific model of job separations yields three hypotheses for civilian job separations and military attrition.

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[4]Mincer and Jovanovic (1962) found that inclusions of this type of heterogeneity controls reduce the slope of the estimated tenure profile by 20 to 30 percent for young men (ages 19 to 29).

Firm-Specific Hypothesis #1. Separation rates decline with tenure after controlling for heterogeneity.

This hypothesis is not examined in the attrition results reported below, because the database is a cohort of military entrants with a common tenure level of zero at entrance. Studies of military retention have found that separation rates decline with military tenure (length of service), but less clear is whether this decline is due to firm-specific human capital or heterogeneity.

Firm-Specific Hypothesis #2. Separation rates are inversely correlated with individual characteristics that are complementary with firm-specific human capital investment.

Education is widely believed to complement acquisition of firm-specific skill and should therefore have a negative effect on separation in the military and civilian sectors. Older, more experienced individuals are expected to select jobs with better investment opportunities. Hence, age and work experience are expected to have a negative effect on the separation rate, after tenure and individual characteristics have been accounted for.

Firm-Specific Hypothesis #3. Indicators of previous job mobility capture individual heterogeneity in the separation propensity and are positively related to the current separation probability.

After controlling for other variables, frequent job changes or unemployment spells provide indications of the desire and ability to acquire firm-specific skills and the likelihood of leaving a particular job.

JOB MATCHING AND JOB SEPARATIONS

Job matching models explain job separations in terms of individual and firm uncertainty and imperfect information. The premise of these models is that individuals and firms enter employment contracts with imperfect information. Each party enters the contract because it expects a mutually beneficial match. As new information emerges, the value of the match is reassessed by each party. In some cases, reassessment results in promotion or wage adjustment. In others, one party to the contract becomes disillusioned and initiates a job separation.

Job matching models fall into two categories depending on the source of uncertainty. The first group is learning or experience models of job separations (Johnson, 1978; Jovanovic, 1979a; Wilde, 1979). Each job is assumed to have a set of unique characteristics that cannot

be fully evaluated by inspection. Consequently, neither the firm nor the individual can ascertain the true value of a job match without "experiencing it." Individuals will experiment with jobs and reassess the value of each match after learning more about the underlying characteristics of the job. Through job experience, the individual learns more about his skills, how these skills will complement his performance, how performance is rewarded by the firm, and the potential for acquiring new skills within the firm. This new information about the current job match causes the individual to reevaluate his initial employment contract. Such information may enhance or diminish the perceived value of the match. If the match value is significantly reduced, then the individual will end the contract and choose alternative employment where the perceived benefits are greater.

The second type of matching model is a search model of job separations (Jovanovic, 1979b; Mortensen, 1978; Wilde, 1979). Although the characteristics of an individual job are known with certainty, the worker is uncertain about all alternative job offers. Sorting through alternative offers is costly, so job selection will occur without a complete sampling of alternatives. While on the job, the employee will receive new information about alternative job prospects that will require a reappraisal of the present contract. Job separation occurs when the prospective match offers greater returns then the current match.

Experience models are more appropriate than search models for explaining early attrition in the military. The number of new offers received is probably a function of time and familiarity with the labor market. During the first six months of service, recruits spend most of their time at training bases and have limited contact with civilian labor markets. When considering longer-term attrition, the acquisition of general skills may enhance the recruit's civilian opportunities, and search models of separation may be more appropriate. For early attrition, the main source of new information comes from learning about the military environment, and thus experience models are better suited to explaining early attrition behavior.

Job matching models predict a pattern of separation behavior consistent with three hypotheses.

Job Matching Hypothesis #1. Most job separations occur at low levels of job tenure.

Since individuals learn about job characteristics through firm experience, separations decline as tenure increases. Bad matches consist of individual dissatisfaction with work conditions and employer dissatisfaction with productivity. Good matches enhance the joint wealth of

both parties and create incentives to reduce the probability of separation.

> *Job Matching Hypothesis #2. More uncertainty about the initial employment contract increases the possibility of mismatching and separation.*

Recruits who are familiar with military jobs and their qualifications for those jobs should have relatively low attrition levels.[5] In the same way, experienced individuals have less uncertainty about their earnings opportunities and are less likely to separate from their jobs. Education and aptitude facilitate the accumulation and processing of information, so that we predict that these variables will be inversely related to mismatches and separations.

If this match experience were unique, then unemployment history and past job mobility would not affect the likelihood of future separations. However, some individuals may persistently over- or underestimate their opportunities. In each case, mismatching occurs more frequently, and the separation probability is positively linked with unemployment history and past job mobility. Recent unemployment imposes financial costs on some individuals, which make continued search difficult. Marginal offers are therefore accepted, and mismatches are more frequent.

Job matching implies that job separation is a response to unfavorable conditions compared with initial expectations. As such, the ease of separation (attrition) influences the initial decision to enter an employment contract.

> *Job Matching Hypothesis #3. Mismatches and the probability of separation are positively related to the ease of future separation as perceived at the time of initial hire.*

Other things equal, unfavorable outcomes are less costly if separation is easy, because workers can mitigate bad matches by changing jobs. Therefore, individuals who believe that separation is easy are probably less thorough in examining an offer and will accept relatively less attractive offers than individuals who believe that separation is difficult.

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[5]Similar arguments about information and contracts have been applied in different settings. Becker et al. (1977) contend that individuals with more information about possible alternative enter better marriage contracts and have fewer divorces. Several migration researchers (Allen, 1979; DaVanzo and Morrison, 1982; Yezer and Thurston, 1976) have argued that individuals with more information on an initial move make "better" migration decisions in the sense that subsequent migration is less likely. In psychological turnover research, Muchinsky and Tuttle (1979) contend that turnover is induced by unmet expectations of employees.   ased pre-employment job information enhances the likelihood that employment expectations are met and reduces the likelihood of separation.

The firm-specific human capital and matching models provide different yet complementary explanations of separation behavior. The firm-specific model does not rely on uncertainty: separation patterns are implied by different individual investment patterns and by different rates of growth in firm-specific skills. The experience matching models explain how individuals shop among jobs to resolve uncertainty. After an initial learning period matching models provide no insights into separation behavior. Jovanovic (1979b) merged the job matching models with the firm-specific human capital model to explain life-cycle separation patterns. In his model, well-suited workers (good matches) are more likely to accumulate firm-specific human capital, because separation is less likely. This accumulation over time results in growing wages and a further reduction in the likelihood of separation.

Both kinds of models provide some insights into how individual characteristics influence separations of civilian and military personnel. The firm-specific and matching models do not, however, provide many strong predictions for empirical analysis. Both models depend critically on variables that are primarily unobserved. Inferences are drawn from plausible hypotheses about the way observed variables like education affect unobserved variables like firm-specific investment and the quality of employer-worker job matches. Given these limitations, the models are useful primarily as a framework for interpretation of empirical results.

CONCEPTUAL DIFFERENCES BETWEEN CIVILIAN AND MILITARY SEPARATIONS

Military employment has some characteristics not common in the civilian sector. The most obvious is that voluntary separations (quits) are not allowed. The enlistment contract is a commitment for service until the end of an obligated term. By definition, all separations before the end of the term are service initiated. However, it is probably true that many early discharges are induced by dissatisfied recruits and are disguised "quits."[6] If a recruit is not willing to adapt to military regimen, he will be perceived as malcontented or unproductive, which increases his chances of early separation from the service. The restriction on voluntary separations, although not absolute, alters the

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[6]The services report reasons for all early discharges like motivational problems, behavior disorder, discreditable incidents, and unsuitability. The system for classifying reasons for discharge is inconsistently applied both across and within services. See Comptroller General (1980). These reasons do not give much insight into whether recruits are inherently mismatched or feigning unsuitability in pursuit of more preferred civilian alternatives.

patterns of observed attrition if a stigma is attached to a military discharge, and classes of recruits (e.g., students versus nonstudents, young versus old, middle-class versus disadvantaged) react differently to the stigma. The rigid contract also discourages some marginal enlistment candidates, because the cost of unfavorable outcomes is increased by the added difficulty of inducing separation when those outcomes occur.

Military attrition and civilian job separations are also likely to differ because migration and relocation are more likely associated with military separations. The enlistment decision therefore has a more pervasive impact on individuals than most civilian employment decisions, because enlistment almost always entails a relocation. Relocation costs associated with separation are anticipated at enlistment and presumably reduce enlistment rates. Conditional on enlistment though, lower relocation costs enhance the chances of separation when unfavorable outcomes occur. Hence, we would expect that individuals who are familiar with labor markets in their home areas would have reduced relocation costs if they separate and (other things equal) a higher likelihood of early attrition.

III. DATA AND PATTERNS OF EARLY ATTRITION

MERGED AFEES SURVEY AND ENLISTED PERSONNEL FILE DATABASE

The 1979 Survey of Personnel Entering Active Duty (AFEES survey) was undertaken to assist policy analysis in the areas of accession and first-term enlisted attrition. The survey was administered to active duty enlisted personnel in all four services on the day they signed military enlistment contracts. Data collection occurred in two phases or waves—one in April and May, the other in September and October of 1979. Two types of questionnaires were administered throughout the country in each wave. The first questionnaire concentrated on aspects of the enlistment process and the decision to enlist; the second focused on items that were possible predictors of enlisted attrition and included a special set of questions on the motivation and aspirations of female enlistees. The present study relies on responses from the second type of questionnaire: Form 2 in the spring wave and Form 4 in the fall. Doering et al. (1980a, 1980b) provide a detailed description of the survey design, administration, and contents. Results are based on a weighted analysis file where the survey weights adjust for differences between the survey respondents and all individuals enlisting during the survey. The weighting procedure (Buddin, 1984) accounts for differences in response by AFEES, age, education level, race-ethnicity, sex, service choice, and participation in a Delayed Entry Program (DEP), although the main patterns in nonresponse are related to AFEES and DEP.

A unique aspect of the AFEES data is the richness of information available for analysis of first-term enlisted attrition. The survey yields much more systematic information on individual background factors and motivations at the time of enlistment than is available in the personnel files maintained by the services and DoD. Detailed information was collected on the recruit's educational and work history, his decision to enlist (including the alternative services, civilian jobs, and training programs considered), and his expectations for military life. In the past, most attrition studies (see Sinaiko et al., 1981, and references therein) relied on broad demographic classifications like age, education, race, and Armed Forces Qualification Test (AFQT) score to characterize individual background.

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The more detailed background information available in the AFEES may help fill two gaps in previous attrition research. First, the new variables included may illuminate the underlying behavioral relationships between demographic characteristics and attrition. For example, high school dropouts may be more attrition-prone than graduates because they are less satisfied with their military jobs or because they have worse preservice work experiences than high school graduates. If so, then a naive attrition policy focused on decreasing the proportion of high school dropout enlistments would be less effective than policies aimed directly at job assignment strategies or reducing reliance on those with poor preservice work histories. Second, new information on recruit work history, aspects of the military job match, and job satisfaction may provide new insights about which individuals are high attrition risks or how much attrition is associated with assigning individuals to jobs they dislike.

Using Social Security Number identifiers, the AFEES survey file was merged with personnel records compiled by the Defense Manpower Data Center (DMDC). The merged file consists of a longitudinal history of individuals in the AFEES survey. Individuals are followed from enlistment (AFEES survey collection point) in 1979 to accession (actual start of active duty) and then with quarterly master e records through September 1982, or until the time of separation from the military. The DEP policy in effect at the time of the survey allowed delays in actual military accession for up to twelve months after the time of enlistment, so that actual accessions occurred between April 1979 and May 1980 for the spring wave and September 1979 and October 1980 for the fall wave. Important variables on the accession record include:

- Home state
- Age at entry
- Highest year of education
- Race
- Ethnicity
- Marital status
- AFQT percentile
- Date of accession (day, month, and year)
- Entering pay grade
- Term of service (in years)
- Armed Forces Entrance Examination Station (AFEES)
- Participation and time in DEP
- Initial Training occupation assignment (available for Army only).

The merged file also contains information from individual quarterly master files that document recruit in-service experiences. The quarterly master files include information on the following variables:

- Primary (DoD) occupation code (trained occupation)
- Duty (DoD) occupation code (assigned occupation)
- Current pay grade
- Marital status
- Number of dependents
- Service-specific occupation code
- Date of achieving current pay grade

The final component of the merged file is a loss record for individuals who separate from the services before September 1982. The loss record closely resembles the quarterly master record but includes the date of separation and the reason for separation. Early attrition is defined as separation during the first six months after accession.

Some survey information is also available from DMDC personnel files. This apparent "duplication" proved useful in filling missing values in the survey data. Key variables like service, DEP status, race, education level, and age are available from both the survey and personnel files. While these variables correspond very closely for most recruits, more missing values exist in the survey, where the questionnaire items were self-administered, than in DMDC personnel files. To minimize these missing value problems, this research relies on variables from personnel files when those variables are available. In the case of education, special preference is also given to the education level reported on the accession record, because many recruits who are high school seniors at the time of enlistment have actually graduated before entering active duty.[1]

The merged AFEES/personnel database includes 12,063 observations. Several exclusions, however, needed to be made in constructing the early attrition analysis file. The research is restricted to male recruits; thus the 2274 records of female recruits were excluded. Among the remaining records, 768 were excluded because the enlisted term of service was six years.[2] A smaller number of records were

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[1]The survey's education questions ask for the highest grade and degree *expected* by the time of accession. The responses to the question closely correspond with *actual* educational status at the time of accession.

[2]Six-year enlistment terms are seldom chosen except in a few high-skilled occupations where they are required by the services. As a result, it seemed likely that attrition might differ substantially in this group from others and that term effects might mask occupational differences. The relatively small size of the six-year term sample spread over the Navy and Air Force precluded any substantial analysis of this group separately.

excluded because the individuals had reported to officer's candidate school (96 records), died during active service (16 records), joined the reserves (27 records), or had missing values for the service of accession and term of enlistment variables (192 records). After these exclusions, the final analysis file consisted of 8690 observations.

The occupational information available from the accession and master/loss records was not very useful for the analysis of early attrition. In its 1979 personnel files, DMDC has reliable training occupation information only for the Army. In the other services, training occupation could potentially be inferred from the occupation code on the master/loss records. For most losses during the first six months, however, individuals are occupationally classified only as "trainees." Obviously, occupational differences in attrition cannot be analyzed when only survivors obtain formal occupational classifications. Even the Army data are less than ideal for detailed occupational analysis, because the sample size (4152) precludes occupational classifications beyond the one-digit DoD occupational level.[3] Given these problems, this research does not include variables representing individual training occupations. Measures of the individual's satisfaction with his military job and characteristics of his job match are part of the early attrition analysis.

ENLISTMENT PROFILE AND PATTERNS OF EARLY ATTRITION

The analytic framework developed in Sec. II suggests that a number of factors could affect early attrition. This subsection introduces the main analysis variables, provides profiles of individuals enlisting in each service, and examines simple one-way differences in early attrition rates with respect to individual background characteristics, prior work experience, job match characteristics, and other factors. These differences are interpreted cautiously, because many of the variables are highly correlated with other variables influencing early attrition. Section IV presents results from a multivariate model of early attrition that controls for a variety of factors simultaneously and isolates the contribution of a single factor.

Attrition analysts (see Sinaiko et al., 1981, and references therein) have consistently demonstrated that high school dropouts have much

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[3]The author has previously analyzed differences in Army post-training attrition by very specific (three-digit) job classifications (Buddin, 1981). The post-training research was based on the entire FY75 accession cohort of over 38,000 observations, and analysis of very specific military jobs was possible.

higher attrition rates than graduates of high school. Table 3.1 reveals the expected relationship between education and early attrition in each service but also shows an apparent link between age and early attrition in several services. Among high school graduates, early attrition rates increase with age in the Army, Navy, and Marines. The age effect is most pronounced in the Army and Marines where the early attrition rate of 17-year-olds is 6.0 and 11.6 percentage points higher than for 19-year-olds. The positive relationship between age and early attrition also holds for non-high school graduates in the Army, but small cell sizes preclude drawing conclusions about the relationship for non-diploma graduates in other services. The results in Table 3.1 suggest the possibility that loss rates during the first six months could be reduced in the Army, Navy, and Marines by increased emphasis on attracting younger recruits.

The Air Force has a lower level of early attrition than other services both overall and among high school graduates. The highest incidence of early attrition occurs in the Army, which primarily reflects the fact that only 51 percent of Army recruits are high school graduates as compared with over 70 percent of the recruits in other services. Nongraduates in the Army actually have slightly lower attrition than in other services. Finally, Table 3.1 reveals that the attrition rates of those with certificates of general educational development are comparable with other non-diploma graduates and substantially higher than those of formal high school graduates.

The merged AFEES/personnel database raises several questions about prior employment experiences. This factor is frequently cited in civilian analyses of job separations but has not previously been considered in analyzing military attrition. Table 3.2 describes how early attrition rates vary with employment status at enlistment, with unemployment experience before enlistment, and with the number of previous employers. The job matching hypotheses implied that recruits with past unemployment or several job changes should be more separation-prone than others. In the Navy, Air Force, and Marines, recruits with a previous spell of unemployment have higher early attrition rates than those with no unemployment spell in the previous year. Early attrition rates also follow the expected pattern of increases with the number of previous employers for the Army, Air Force, and Marines.

Attrition rates also vary with individual employment status at the time of enlistment. Employed recruits have lower rates of early attrition than experienced recruits without current employment. Recruits with no previous work experience have attrition rates higher than those with any labor market experience.

Table 3.1

EARLY ATTRITION PERCENTAGES BY ENLISTMENT AGE
AND EDUCATION IN EACH SERVICE

(Cell size)

Education	Age 17	Age 18	Age 19	Age>19	All ages
Army Early Attrition Percentages					
Not HS graduate	12.5 (479)	13.9 (613)	18.0 (287)	18.0 (367)	15.0(1748)
GED[a]	12.9 (52)	19.7 (91)	16.1 (53)	15.2 (89)	16.4 (284)
HS graduate or beyond	4.8 (357)	7.0 (610)	12.1 (456)	10.8 (697)	9.0(2120)
All education	9.4 (889)	11.1(1315)	14.5 (797)	13.4(1152)	12.0(4152)
Navy Early Attrition Percentages					
Not HS graduate	17.5 (140)	24.7 (73)	32.9 (30)	28.7 (35)	22.5 (280)
GED[a]	16.3 (49)	5.4 (44)	8.3 (23)	22.4 (37)	13.4 (153)
HS graduate or beyond	5.6 (261)	8.5 (382)	9.6 (211)	8.3 (334)	8.2(1189)
All education	10.5 (451)	10.6 (499)	12.2 (264)	11.7 (407)	11.1(1621)
Air Force Early Attrition Percentages					
Not HS graduate	16.1 (39)	25.7 (41)	21.3 (14)	8.3 (19)	18.9 (114)
GED[a]	22.8 (54)	22.1 (52)	20.4 (35)	14.4 (40)	20.3 (180)
HS graduate or beyond	8.2 (260)	5.8 (503)	4.4 (289)	8.0 (428)	6.6(1481)
All education	11.4 (353)	8.6 (596)	6.8 (339)	8.6 (488)	8.8(1776)
Marines Early Attrition Percentages					
Not HS graduate	17.4 (129)	16.3 (96)	27.3 (27)	35.7 (30)	19.9 (283)
GED[a]	9.3 (14)	25.0 (16)	0.0 (3)	3.9 (9)	13.7 (42)
HS graduate or beyond	5.0 (229)	6.5 (299)	10.7 (134)	16.6 (155)	8.7 (817)
All education	9.5 (372)	9.5 (411)	13.2 (164)	19.0 (194)	11.6(1141)

[a]General Educational Development Certificate.

Table 3.2

EARLY ATTRITION PERCENTAGES BY PRIOR
EMPLOYMENT EXPERIENCE AND SERVICE

(Cell responses)

Experience	Army		Navy		Air Force		Marines	
Unemployment in past year								
Unemp spell	11.9	(1485)	15.0	(548)	12.8	(580)	15.0	(406)
No spell	12.1	(2666)	9.2	(1073)	6.8	(1196)	9.8	(735)
No. of previous employers								
One	8.2	(522)	10.0	(219)	4.9	(236)	9.6	(233)
Two	9.2	(701)	12.9	(290)	8.2	(373)	10.6	(228)
Three	9.5	(803)	10.9	(322)	8.7	(393)	12.3	(200)
Four	11.8	(493)	8.6	(226)	9.2	(223)	13.9	(109)
Five or more	19.4	(806)	10.2	(321)	11.3	(350)	13.5	(166)
Employment status at enlistment								
Employed	11.0	(849)	6.7	(500)	7.3	(575)	10.9	(325)
Not currently employed	11.7	(2609)	12.2	(973)	9.2	(1052)	13.0	(697)
No previous experience	14.8	(316)	9	(69)	8.4	(69)	5.3	(71)

NOTE: The number of cases varies on different questions,
because of missing responses.

Table 3.3 shows how early attrition rates vary according to the military job match and the initial satisfaction with the military job. Presumably, circumspect individuals are aware of the type of jobs they qualify for before enlistment day, because they have more thoroughly evaluated the situation. Since they have more information on the prospective job match, they are likely to make fewer mistakes and fewer mismatches. In the Army, Navy, and Air Force, those recruits who "knew kind of job qualified for before enlistment day" have lower early attrition rates than those who did not. Recruits who are *not* qualified for the desired kind of job are more likely to separate both because they are placed in a less desirable alternative and they probably have more uncertainty about their prospects in the alternative job. Except in the Air Force, attrition is higher among enlistees who are unqualified in their desired job. Recruits who are not concerned about their military job at all have higher early attrition rates than others in

Table 3.3

EARLY ATTRITION PERCENTAGES BY MILITARY
JOB MATCH CHARACTERISTICS AND SERVICE

(Cell size)

Characteristic	Army	Navy	Air Force	Marines
Knew kind of job qualified for before enlistment day				
True	10.5 (1917)	8.8 (1077)	8.4 (1346)	12.7 (588)
False	13.5 (2129)	14.6 (521)	10.2 (416)	10.5 (532)
Not qualified for kind of job desired				
True	13.8 (1020)	13.1 (289)	8.1 (215)	16.4 (150)
False	11.4 (2991)	10.1 (1293)	9.0 (1539)	10.3 (951)
Kind of job didn't really matter				
True	14.3 (619)	18.1 (131)	7.2 (96)	16.3 (152)
False	11.6 (3402)	9.8 (1453)	9.0 (1655)	10.5 (941)
Job satisfaction at enlistment				
Very satisfied	11.8 (2371)	10.2 (985)	9.5 (1036)	12.8 (587)
Somewhat satisfied	10.4 (1287)	9.0 (480)	7.1 (551)	10.2 (289)
Neither satisfied or dissatisfied	15.3 (320)	24.5 (117)	10.1 (141)	11.0 (195)
Somewhat or very dissatisfied	18.4 (129)	24.4 (25)	8.8 (33)	4.1 (28)

NOTE: The number of cases varies on different questions, because of
missing responses.

the Army, Navy, and Marines. Table 3.3 also reveals that Navy and
Air Force recruits are more knowledgeable and concerned about their
prospective military jobs than their counterparts in the Army and
Marines, i.e., Navy and Air Force recruits are more concerned about
their job assignments and much more likely to investigate their job
qualifications before enlistment than those in other services.

The AFEES survey also solicited information on recruit satisfaction
with his military job at the time of enlistment. It appears that new
recruits are almost uniformly satisfied with their prospective military
jobs: About 80 percent of the Marine recruits are either "very satis-
fied" or "somewhat satisfied" with their jobs, and the proportion is over
90 percent for the other three services. Differences in early attrition
rates for alternative levels of job satisfaction do not follow any con-
sistent pattern. In fact, the pattern among the two most satisfied

groups is counterintuitive, i.e., the modal "very satisfied" group has higher attrition in each service than the "somewhat satisfied" group.

Another group of variables that might influence early attrition relates to decisions made at the time of entry. Table 3.4 reveals how early attrition rates differ with participation in DEP and individual attainment of first service choice. DEP participants have lower early attrition in all services than nonparticipants. DEP allows a delay before entering active duty for up to twelve months. The delay typically occurs either to await openings in a given occupation or for the recruit to take some leisure or to finish school before accession. In general, individuals who attain their first choice of service are better matched than others and have lower early attrition rates in all services.

Tables 3.1 through 3.4 suggest that early attrition rates vary substantially with factors like prior employment history, job match characteristics, and entry point decisions, as well as the more traditional variables like age and education. Interdependencies among many of the variables, however, may mask the underlying link between any given variable and early attrition. If DEP participants are predominantly younger and better educated than nonparticipants, for example, DEP participation may actually have little influence on attrition. Similarly, if individuals with poor work histories are high school dropouts or are not qualified for the kind of military job they desire, then the link between these variables and early attrition is readily misinterpreted. The multivariate early attrition model in the next section controls for these and related variables simultaneously.

Table 3.4

EARLY ATTRITION PERCENTAGES BY ENTRY
POINT DECISIONS AND SERVICE

(Cell size)

Characteristic	Army	Navy	Air Force	Marines
Delayed Entry Program				
Participant	11.2 (2972)	10.2 (1071)	7.1 (1264)	9.8 (784)
Nonparticipant	14.3 (1179)	12.9 (550)	13.0 (512)	15.7 (357)
First choice service				
True	11.7 (3331)	10.6 (1496)	8.6 (1747)	11.6 (1070)
False	13.6 (783)	17.1 (119)	18.3 (24)	13.0 (69)

NOTE: The number of cases varies on different questions, because of missing responses.

IV. MULTIVARIATE MODEL OF EARLY
ATTRITION

Section III revealed differences in early attrition rates across various factors that may influence attrition. Since many factors (e.g., education and AFQT) are interrelated, these unconditional correlations may provide misleading indications of the underlying link between an individual characteristic and early attrition. In this section, a multivariate model of early attrition is developed that controls for the effects of a variety of factors simultaneously. This methodology yields a more accurate indication of the separate, conditional contribution of a particular factor on early attrition. The statistical methodology is described in Appendix A.

Individual attributes are measured at the time of enlistment and can be classified into six groups: demographic characteristics, prior experience, job match and satisfaction, entry point decisions and programs, alternatives to military service, and socioeconomic background. Past attrition research has focused primarily on demographic characteristics such as age, education, race, and region of origin.[1] The richness of the AFEES database allows a more complete representation of individual background before accession. The inclusion of prior experience, job satisfaction, and information on alternatives assures greater comparability with the civilian separation studies.

A discriminant regression equation was estimated for each service and for all services combined. The estimated coefficients and standard errors are reported in appendix Table B.2. Variables are defined in appendix Table B.1. The remainder of this section is devoted to an analysis of the empirical results. First, I compare early military attrition for all services combined with the civilian job separation behavior of young workers. The pooling of recruits across services is warranted by the similar qualitative effects of most variables on early attrition. Next, the determinants of early attrition by service are compared and contrasted. Finally, the section concludes with a comparison of early attrition results and prior analysis of attrition over the entire first term and post-training attrition.

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[1]The measured effect of these variables on attrition may be biased by the omission of previously unmeasured variables available in the AFEES survey.

MILITARY AND CIVILIAN SEPARATIONS

Demographics

Table 4.1 reports the effects of demographic variables on early attrition. The table entries show the estimated change in the probability of

Table 4.1

INFLUENCE OF DEMOGRAPHIC CHARACTERISTICS
ON EARLY ATTRITION
(t-statistics in parentheses)

Characteristic	Percentage Change	
Service		
Army, combat	-1.17	(1.15)
Navy	3.10	(2.67)*
Air Force	2.33	(2.02)*
Marines	3.49	(2.73)*
Age at enlistment	1.12	(4.15)*
Education		
Not HS graduate	8.08	(9.03)*
GED	7.55	(5.53)*
Some post HS	-2.02	(0.99)
AFQT	-0.08	(4.51)*
Race		
Black	-4.08	(4.27)*
Hispanic	-4.22	(3.04)*
Fall enlistment	0.25	(0.33)
Region of origin		
Northeast	0.81	(0.81)
North Central	2.57	(2.79)*
West	0.77	(0.75)

NOTES: Starred entries are based on discriminant coefficients in appendix Table E.2 that differ significantly from zero at the 5 percent level. The reference categories are noncombat Army, high school graduates, white non-Hispanics, and South.

early attrition (in percent) with respect to each variable, evaluated at the overall average attrition rate. For example, the Navy has an early attrition level 3.14 percentage points higher than Army noncombat specialties after controlling for the quality (age, education, prior work history, etc.) of recruits. In fact, although actual early attrition rates are higher in the Army than other services, these results imply that the Army would have early attrition rates 2 to 3 percentage points lower than other services if they could attract recruits of comparable quality. The Army is more successful than other services at retaining recruits of a given quality through the first six months of service. This success may reflect either Army attrition policy relative to other services or that Army recruits may make relatively fewer mistakes in choosing the military. Army combat and noncombat enlistees do not differ significantly in terms of early attrition.

Early attrition *increases* about 1 percentage point per year for each year at enlistment beyond age 17.[2] The age effect on early attrition reported in Table 4.1 is sharply at odds with previous findings, which reveal a decline in civilian separations as an individual grows older (Mincer and Jovanovic, 1982; Mobley et al., 1979). For purposes of comparison with the early attrition results, I estimated separation equations for young civilian workers in the National Longitudinal Survey of Labor Force Behavior, Youth Survey 1979 (NLS).[3] The NLS results in Table 4.2 indicate a 3 percentage point decline in annual civilian separations for each yearly increment in age. Civilians with more years of experience are better informed about their abilities and interests; therefore, they can better evaluate job attributes and, in general, make fewer job mismatches.

The different effect of age on military and civilian separations suggests some underlying difference between employment in the two sectors. Perhaps the services are attracting labor market "lemons" from the older civilian populations who are labor market misfits and do worse than one would expect based on measured employment history variables.

The most persistent attrition finding is that high school diploma graduates have markedly lower attrition than nongraduates. This study provides further support for this finding: The early attrition rates of non-high school graduates and recruits with certificates of

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[2] A quadratic age specification was tested, but the quadratic term added insignificantly to the explanatory power of the equation. The F-statistic with (1,8627) degrees of freedom was 0.62 and was insignificant at the 95 percent confidence level.

[3] These results are from computations on the National Longitudinal Survey of Labor Force Behavior, Youth Survey 1979 and 1980. Separation is defined as employment with a different employer on the 1980 survey date than on the 1979 survey date.

general educational development (GED) are 8 percentage points higher than for high school graduates. Recruits with more than a high school education do not have significantly different early attrition rates than high school graduates.

Why is the attrition rate of dropouts so high? The AFEES data provide comprehensive information on individual work experience, job match and satisfaction, entry point decisions, alternatives to the military, and socioeconomic background. One might expect that dropouts are markedly different from graduates in many of these respects, and the omission of this detailed information in previous studies overstated the true effect of education on attrition. For example, if dropouts had decidedly worse employment records than graduates, then the estimated effect of dropout status on attrition without controlling for

Table 4.2

INFLUENCE OF DEMOGRAPHIC CHARACTERISTICS ON
ANNUAL PROBABILITY OF CIVILIAN SEPARATION
(t-statistics in parentheses)

Characteristic	Percentage Change
Age	-3.41 (2.32)*
Highest grade completed	-1.01 (0.54)
AFQT	0.09 (1.17)
Race	
Black	-6.99 (1.39)
Hispanic	-5.40 (0.95)
Region of origin	
East	-12.46 (2.49)*
North Central	-6.23 (1.40)
West	4.09 (0.79)

NOTE: Starred entries are based on discriminant coefficients in appendix Table B.4 that differ significantly from zero at the 5 percent level.

employment history would be overstated.[4] The results in Table 4.1 suggest that this type of reasoning does not hold true—dropout status in and of itself is a strong predictor of early attrition after controlling for a broad variety of background variables. The education effects reported in Table 4.1 are not significantly different from those based on a regression specification including only demographic variables.[5]

Separate regressions were also estimated for the high school graduate and nongraduate samples to test whether other demographic and nondemographic variables have differing effects on the two groups. These results indicate that other demographic variables, prior experience, job match and satisfaction, entry point decisions, alternatives to the military, and socioeconomic variables have similar impacts on the attrition rates of both graduates and nongraduates. In short, other background variables do not alter the strong relationship between dropout status and early attrition.

In contrast to military attrition, civilian job separations of young workers are not affected by education level. The insignificance of the education coefficient in Table 4.2 is consistent with previous studies of civilian separations (Blau and Kahn, 1981; Leighton and Mincer, 1982; and Viscusi, 1980). Why does education influence military and civilian separations so differently? The analytic framework in Sec. II provides some insight into this question but no strong conclusions. Perhaps education (high school graduation) is more necessary to learn skills in military than in civilian jobs. This explanation seems unlikely because most military jobs have a civilian counterpart and AFQT explicitly controls for differences in individual aptitude. Perhaps the military involves more intangibles than most civilian jobs, so that job shoppers are less able to assess their suitability for military than civilian jobs. Then better educated individuals (presumably with more skill in deciphering information) are better matched with the military. Finally, attitudinal or behavioral problems associated with dropout status may be less compatible with military discipline and demands than with those of civilian employment.

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[4]The omitted variable bias equals βb where β is the "true" effect of employment history on attrition, and b is the regression coefficient in an auxiliary regression of dropout status on employment history. The firm-specific human capital model predicts that a poor employment history (e.g., many job changes) will have a positive effect on current separations, i.e., the sign of β is positive. Dropouts may also have worse employment histories than graduates, so the sign of b is also positive. Then, the bias is positive, and the estimated effect of dropout status on attrition is overstated relative to the "true" effect.

[5]The coefficients and standard errors for the full specification and the specification with only demographic variables are reported in appendix Tables B.2 and B.3, respectively.

Individuals with higher aptitude are more able to assimilate informa-
tion; in keeping with this assumption, the job matching hypothesis
predicts that those with higher AFQT will have fewer mismatches. It
turns out that AFQT has a significant but small effect on early attri-
tion. At the sample average, a 12.5 percentage point increase in AFQT
would decrease attrition during the first six months by only 1 percen-
tage point. Apparently, civilian separations are not affected by AFQT.

Blacks and Hispanics have an early attrition rate 4 percentage
points lower than white non-Hispanics, after controlling for other indi-
vidual characteristics. Several authors have argued that members of
minority groups are less quit-prone because discrimination reduces
their available alternatives (Blau and Kahn, 1981; Burton and Parker,
1969; Chapman, 1981). The civilian separation results reported in
Table 4.2 indicate insignificant race effects, but other authors have
found lower civilian separation rates for minorities, after controlling
for other worker characteristics (Blau and Kahn, 1981; Chapman, 1981;
Viscusi, 1980).

Because the AFEES survey consisted of a spring and fall wave, an
indicator variable was constructed to represent fall enlistments. In the
tight recruiting market of 1979, recruiters may have drawn lower-
quality recruits into the services in the fall to meet recruiting shortfalls
at the end of FY79 (September 30, 1979). Although this effect should
be reflected directly in several other quality variables like AFQT and
education level, the indicator variable is a proxy for any unobserved
quality distinction between the spring and fall waves. In fact, the
effect of this variable is insignificant.

Both early attrition and civilian job separation rates vary signifi-
cantly with region of origin. In the military, individuals from the
North Central region are higher attrition risks than those from other
parts of the country. Civilian separations are lowest in the East, after
controlling for other individual characteristics.

Prior Experience

The analytic framework in Sec. II implied that experience before
enlistment should affect attrition. Several studies of civilian separa-
tions (Leighton and Mincer, 1982; Mincer and Jovanovic, 1982; and
Tuma, 1976) have reported a positive relationship between the rate of
past job changes and separation from the current job. Unemployment
history has a positive effect on separation in some studies (Bartel and
Borjas, 1977; Leighton and Mincer, 1982), but an insignificant effect is
reported in others (Flinn and Heckman, 1980; Heckman and Borjas,
1980).

The coefficients in Table 4.3 indicate that work history has an important bearing on successful adjustment to the military. Most recruits (83 percent) have some work experience before accession, but individuals with no previous jobs have early attrition rates about 3.4 percentage points higher than those with some work experience. This finding is consistent with the job matching hypothesis relating job separations and uncertainty about the initial employment contract. First-job recruits are probably less informed about their opportunities and interests. They may also have more misconceptions about the full ramifications of an employment commitment. Consequently, more mismatches are likely in first-job situations.

The early attrition level is not affected by either the employment or enrollment status of individuals at the time of enlistment. Among nonstudents, lack of current employment may signal a bad job match with the military because the financial costs of job search unduly hasten enlistment. No significant difference is estimated between the

Table 4.3

CONTRIBUTION OF PRIOR EXPERIENCE
TO EARLY ATTRITION
(t-statistics in parentheses)

Characteristic	Percentage Change	
Work history		
Currently employed	-0.12	(0.14)
Never worked	3.34*	(2.01)
No. of employers	1.08*	(3.62)
Unemployed last year	2.17*	(2.81)
School enrollment		
Full time	-0.33	(0.33)
Part time	-1.23	(0.65)

NOTE: Starred entries are based on discriminant coefficients in appendix Table B.2 that differ significantly from zero at the 5 percent level. The reference category for school enrollment is nonstudents. The percentage change in early attrition associated with a change in the number of employers is evaluated at age 19.

attrition rates of employed and nonemployed enlistees, although recent unemployment (discussed below) does increase the likelihood of a mismatch. The large link between dropout status and attrition suggests that students might have lower loss rates than nonstudents. The link could mean either that attainment level itself was important or that people coming to the services from a school environment are more likely to "fit" than recruits with other experiences. The insignificance of school enrollment coefficients suggests that the attainment level itself is the critical variable, not the student status at the time of enlistment. Students who enlisted presumably planned to leave school, just as nonstudents already had. The intervening employment experiences of nonstudents are apparently controlled by other variables.

Frequent job changes enhance the likelihood of early military separation. Workers who have difficulty finding good job matches in the civilian sector are also poor risks in the military; each previous job before enlistment increases the probability of early attrition by 1.1 percentage points.[6] This finding is consistent with recruit heterogeneity in firm-specific human capital investment. Individuals with high propensities to separate in the civilian sector are also more prone to early military separation.

Previous unemployment also heightens early attrition. An unemployment spell during the year before enlistment increases the early attrition rate by 2.2 percentage points. The job matching model predicts that financial pressures from unemployment result in more bad matches (Kahn and Low, 1982). On the other hand, individuals with recent unemployment may have different tastes or opportunities for firm-specific human capital investment than those without recent unemployment. Just as in the civilian sector, past unemployment is a precursor of early military separation.

Although high school graduation status is the primary *single* factor affecting attrition, age and previous employment stability together have comparable influences on early separations. Consider the estimated early attrition rates of two types of recruits.[7] The first type is age 17 at

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[6]The regression specification reported in appendix Table B.2 and used to generate Table 4.3 includes an age-number of employers interaction to account for the expected increase in employers with age. The coefficient on number of employers means that enlistees of a given age with several previous employers are more attrition-prone than enlistees of the same age with relatively few previous employers.

[7]These combinations of characteristics are common among enlistees in the AFEES survey. About 26 percent of all enlistees are age 17, and an equal percentage are age 20 or above. Prior work experience is more common among older enlistees, but experience is common for all enlistees, e.g., 85 percent of the 17-year-old enlistees have worked as compared with 93 percent of the 20-year-olds. About 45 percent of the 17-year-old enlistees have had one or two previous employers; whereas, 43 percent of the 20-year-old enlistees have had four or more previous employers. In the year before enlistment, 40 percent of the 17-year-old enlistees experience a spell of unemployment as compared with 33 percent of the 20-year-olds.

enlistment and has a stable work history with one previous employer and' no unemployment in the year before enlistment. The second type is age 20 with four previous employers and a spell of recent unemployment. The older recruits with less employment stability have expected early attrition rates more than twice those of 17-year-old recruits with steady employment (Fig. 4.1). Among both high school graduates and nongraduates, early attrition rates vary substantially with the entrance age and preservice employment stability of recruits. The attrition rate of graduates is twice that of high school dropouts, but the older group of graduates with employment instability has an early attrition rate of 12.2 as compared with 10.9 for younger dropouts with a steady employment. At the extreme, older dropouts with poor employment histories are four times as likely to leave during the first six months as young high school graduate enlistees with employment stability.

The significance of age and prior work experiences in predicting early attrition suggests that these variables could be used along with high school graduation status to target military applicants. While nonattrition is certainly not an ideal measure of military performance,
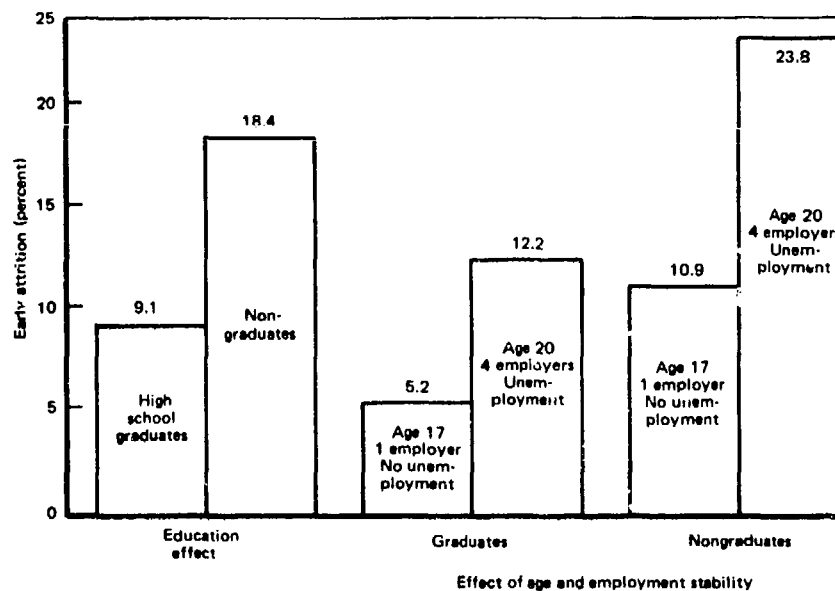
Fig. 4.1—Early attrition predictions differ by age and
employment stability in addition to graduation status

work history does help to predict which individuals will survive the initial transition to military life, a crucial prerequisite for a successful military job match.

Job Match and Satisfaction

The AFEES data provide a unique opportunity to assess links between the job assignment process in the military and subsequent early attrition. In making job assignments, the services must weigh job availability and aptitude as well as preferences. Nevertheless, an assignment scheme that placed recruits in undesirable or hastily considered jobs could increase attrition and obviate the goal of shifting manpower into needed occupations.

The process by which a recruit is "fit" with a specific military job may be indicative of the quality of the match. Enlistees who are not knowledgeable about military jobs, their qualifications for those jobs, or even about what type of job they desire are less able to discriminate among jobs for which they are well-suited. As a result, the probability of a poor job match is enhanced, and the resulting disruption may precipitate early separation.

Table 4.4 reports the effects of several aspects of the specific job match on early attrition. Pre-enlistment-day knowledge about military jobs has no significant impact on early separations, i.e., separation rates are unaffected by whether recruits are qualified for the job they desire or get the job they prefer. The only military job match characteristic that has a significant coefficient is for a variable indicating that the recruit is indifferent to the type of military work he is assigned. The early attrition rate among the 12 percent of recruits who are indifferent to their job assignment is 2.4 percentage points higher than for those who are concerned.

Measures of general satisfaction at the time of enlistment were also used to assess the role of the recruit-military match in early attrition.[8] Recruit satisfaction with the individual characteristics of his specific military job does not significantly affect early attrition. Similarly, separation is not influenced by overall satisfaction with military life. It should be noted that these variables reflect initial contact with the military, since the satisfaction variables are measured at the point of enlistment.[9] While subsequent levels of satisfaction may influence

[8]Many economists are reluctant to use satisfaction variables because they are subjective, i.e., they reflect what individuals "say" and not what they "do." This criticism and others are discussed by Freeman (1978).

[9]Measures of job satisfaction have traditionally been used by sociologists and industrial psychologists in the analysis of job separations (Mobley et al., 1979; Miller et al., 1979; Arnold and Feldman, 1982). Economists have shown increasing interest in satis-

Table 4.4

INFLUENCE OF JOB MATCH AND SATISFACTION
ON EARLY ATTRITION

(t-statistics in parentheses)

Characteristic	Percentage Change	
Job match characteristics		
Knew job qualified for	-0.82	(0.61)
Counselor told best job	0.77	(1.54)
Not qualified for job	0.01	(1.17)
Job not available	-0.26	(0.35)
Not expected job	1.29	(1.52)
Indifferent to job	2.40*	(2.13)
Satisfaction variables		
Job satisfaction	0.21	(0.41)
Overall satisfaction	0.18	(0.59)

NOTE: Starred entry is based on dis-
criminant coefficients in appendix Table
P.2 that differ significantly from zero at
the 5 percent level.

faction measures for analyzing labor market behavior (Flanagan et al., 1974; Bartel and Borjas, 1977; and Freeman, 1978). Researchers have offered a variety of interpretations for the influence of job satisfaction on separation. One explanation (Vroom, 1974) suggests that job satisfaction reflects differences in the personalities of individual workers. Accordingly, job satisfaction is linked with measures of individual adjustment and not with the characteristics of individual jobs. In this context, job satisfaction represents underlying personality traits, and less satisfied, well-adjusted recruits are expected to have higher attrition rates.

Another explanation relates differences in job satisfaction to differences in the objective characteristics of jobs. Locke (1976), for example, shows that job satisfaction measures are correlated with specific workplace characteristics like working conditions, supervision, and promotional opportunities. Since these workplace characteristics are frequently unreported on surveys, job satisfaction serves as a proxy for these unobserved objective characteristics. Kalleberg (1977) argues that this view has important practical problems because individuals evaluate the same "objective" characteristics of jobs differently. In fact, one would suspect that this evaluation would be influenced by the personality traits of the individual, which were the focus of the first interpretation. Setting aside these thorny evaluation problems, jobs with more "good" characteristics will in turn generate a higher level of job satisfaction, and the relationship between attrition and job satisfaction should be negative. Economists (referenced above) have interpreted job satisfaction as a proxy for omitted unobserved characteristics of the workplace.

Finally, several authors (Arnold and Feldman, 1982; Kalleberg, 1977; and Freeman, 1978) have interpreted job satisfaction as an endogenous variable that directly or indirectly influences job separation. Arnold and Feldman (1982) use path analysis to show that job satisfaction influences the intention to search for alternative jobs, and the search for alternative jobs influences the probability of job separation. Kalleberg (1977) suggests that satisfaction is linked not only to the objective characteristics of jobs, but to the motives and meanings that individuals attach to work activities. Freeman (1978) compares and contrasts the determinants of job satisfaction and job separation.

attrition, *initial* job satisfaction and overall military satisfaction do not significantly affect early attrition.

Civilian separation studies have consistently shown that dissatisfied workers are more prone to separate than satisfied workers, both before and after controlling for a variety of other individual characteristics (Arnold and Feldman, 1982; Bartel and Borjas, 1977; Flanagan et al., 1974; Freeman, 1978; Miller et al., 1979; Mobley et al., 1979). Why is satisfaction a better barometer of civilian separation than early attrition? One reason for this distinction may be rela ed to the different work experiences of individuals in the AFEES survey from those in the civilian separation studies. In each civilian study, the sample consists of currently employed workers, not new job candidates as in the AFEES survey. As a result, AFEES respondents are less well-informed about the characteristics of their jobs than individuals in the civilian studies. If the link between job satisfaction and separation is enhanced by increased job experience, then the perceived difference in the effect of satisfaction variables on military and civilian separations may not reflect any underlying difference in separation behavior in the two sectors.[10] On the other hand, job satisfaction may inherently be a worse predictor of early attrition than of civilian separations. If true, this explanation could reflect a variety of factors like an inability to anticipate future work situations in the military or unobserved differences in individuals who choose to enlist.[11]

The insignificance of most job match characteristics and satisfaction variables in Table 4.4 suggests that the military assignment process is not exacerbating the level of early attrition. Most recruits are concerned about the type of work they will perform in the services and at least are initially satisfied with the job offered. Those whose interests are redirected into unexpected or less desired occupations because of

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[10]A civilian separation regression including an interaction term between satisfaction and job tenure would reveal whether satisfaction is a less important factor in predicting separations among new job hires than among more veteran employees. The author is aware of no study that has examined this issue, although Freeman does estimate significant satisfaction effects on separations for young men (ages 19–29) who presumably have relatively low tenure levels. The AFEES survey cannot be used to test this type of hypothesis because the tenure level of the sample is identically zero at the time of the survey.

[11]In general, job satisfaction questions have received less attention in studies of military separations than in studies of civilian separations. This difference partly reflects a reliance on databases for military research that do not contain measures of individual job satisfaction. Previous studies of the relationship between military separations and job satisfaction are reenlistment studies that focus on separations at the end of an enlistment term. Chow and Polich (1980) find that individuals with favorable attitudes toward the military are more likely to reenlist at the end of the first term. In a recent study of second-term reenlistment behavior, Hiller (1982) finds that job satisfaction variables and work environment have only a slight influence on second-term intentions to reenlist.

aptitude or military requirements are no more attrition-prone than those who get their first occupational choice.

Entry Point Decisions

To encourage enlistment, several inducements are available, including service choice, entry date choice, guaranteed location assignment after training, and desirability of post-training location. The primary effect of these options is on enlistment decisionmaking, but the recruit may have lower attrition because his assignments are more consistent with his tastes and expectations.

Table 4.5 reports the effects of various enlistment options on early attrition after controlling for other variables in the multivariate model. Most entry point decisions have no significant impact on early attrition. Recruits who are matched with their preferred service are no less likely to leave than recruits who accept a second choice of service. Individuals with guaranteed location assignments or with preferred location assignments are no less likely to separate. The insignificance of these variables indicates either that all this information may affect only the decision to enlist, initial preferences are not important predictors of subsequent desires, or these match characteristics are simply not important aspects of early adjustment success in the military.

The main enlistment option influencing early attrition is participation in a delayed entry program (DEP). DEP is a service option that allows a recruit to wait up to twelve months after enlistment before

Table 4.5

INFLUENCE OF ENTRY POINT DECISIONS
ON EARLY ATTRITION
(t-statistics in parentheses)

Characteristic	Percentage Change	
First choice service	-1.38	(-1.20)
Guaranteed location	0.83	(0.96)
Desirable location	-0.76	(-0.87)
Delayed Entry Program	-1.67*	(-2.09)

NOTE: Starred entry is based on discriminant coefficients in appendix Table B.2 that differ significantly from zero at the 5 percent level.

entering active duty. This delay may allow the recruit to finish a school term or civilian job, await a more desirable military job or location, or take some leisure time before entering the military. DEP participants have early attrition rates about 1.7 percentage points lower than nonparticipants.

While DEP matches are more successful than non-DEP matches, the underlying reason is unclear.[12] One hypothesis is that recruits who enter DEP are better matched with the military than those who do not because they wait for a desirable job instead of accepting any training slot available. I tested this hypothesis by examining whether recruits who entered DEP to wait for a military job had lower early attrition than those who chose DEP for other reasons (i.e., to complete school, finish a civilian job, or simply take time off before starting active duty). The results indicated no significant differences in the attrition behavior of those entering DEP for different reasons.

Another possible explanation for the DEP effect is based on a statistical sorting associated with the program. According to this hypothesis, DEP participants have a lower attrition rate than nonparticipants, because unenthusiastic recruits tend to leave the DEP program and not report for service. If true, this self-selection hypothesis suggests that the coefficients for DEP and other variables in the early attrition model may misrepresent the behavior of enlistees by neglecting attrition from DEP. Those entering DEP at enlistment may have no greater chance to complete six months of service than those who do not, if DEP attrition offsets the lower early attrition of DEP participants that report for service. Similarly, those dissatisfied with their job assignments may reconsider their enlistment while in DEP and not report for active duty. In this case, the impact of an adverse job match occurs before active duty.

What are the size and nature of DEP losses? About 4 percent of all AFEES enlistments are discharged from DEP without entering active duty. Since the survey was administered on enlistment day, compar-
. survey information is available for DEP losses and nonlosses alike.
. personnel files do not, however, record reasons for DEP separations. Some high school seniors with low AFQT scores are allowed to enlist but then disqualified if they do not graduate during the DEP period. Others receive disqualifications for a run-in with the police or for injuries while in DEP. Still others are allowed discharges for

_e the DEP coefficient is significant in the overall military equation, the DEP co efficients, while all negative, are not significant in any of the individual service equations reported in appendix Table B.2. This result reflects the greater statistical efficiency associated with pooling across services, which yields smaller errors and greater statistical significance.

voluntary reasons. The Army estimated that about 63 percent of male DEP losses in 1981 were disqualifications (Berryman et al., 1983).

How sensitive are the early attrition results to the exclusion of DEP losses? The early attrition regression specification was rerun for all enlistees (i.e., DEP losses, DEP accessions, and direct ships) where the dependent variable was unity for DEP losses and early attrition losses and zero for enlistees who completed six months of active service. Inclusion of DEP losses changed the corresponding regression coefficient by more than two standard deviations for only two variables— DEP status and full-time student status.[13] If DEP losses are equated with early attrition losses, then the DEP effect in Table 4.5 vanishes, and full-time students are significantly less likely than nonstudents to reach six months of active service. In most respects, the characteristics of DEP losses mirror those of early attrition losses, so the coefficients of the early attrition model are insensitive to the exclusion of DEP losses.

Some DEP disqualifications do differ from other enlistees in an important respect even at the time of enlistment. In some cases, the enlistment contract is essentially a conditional contract where the service agrees to allow the recruit to enter active duty if he meets some condition during the DEP period, e.g., the service accepts some low AFQT high school seniors on the condition that they attain a diploma before accession. Conditional enlistees who are disqualified for not satisfying these initial conditions have not met the same criteria as those who actually do enter. As a result, many of the DEP losses are not comparable with entrants; more succinctly, the services do not allow them to access *because* they do not meet the same criteria as those who do access.

Unfortunately, our data do not contain sufficient information to identify which DEP losses were disqualifications based on nonfulfillment of initial enlistment conditions. If these disqualifications are primarily tied with graduation status, then the DEP loss rate among seniors with low AFQT should be higher than for those with high AFQT. Table 4.6 provides support for this hypothesis. DEP losses among enrolled seniors in low AFQT categories are nearly 2 percentage points higher than for seniors in high AFQT categories. AFQT is also inversely related with DEP losses among nonstudent high school diploma graduates (HSDGs), but the link is much weaker than for enrolled seniors. An implication of Table 4.6 is that the significance of student status in the regression specification combining DEP and early attrition losses *probably* reflects disqualifications of seniors with low

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[13]These regressions are reported in appendix Table C.1.

Table 4.6

DEP LOSS PERCENTAGES BY AFQT
AND STUDENT STATUS FOR SENIORS
AND HIGH SCHOOL GRADUATES

Student Status	Cat 1-3a	Cat 3b-5	Total
Enrolled senior	4.55	6.41	5.46
Nonstudent HSDG	3.41	3.75	3.55
Total	3.97	5.28	4.57

AFQT who do not graduate from high school. I reran the early attrition specification for all enlistees except DEP losses who were high school seniors in AFQT categories 3b to 5.[14] In this regression, no coefficient was as much as one-and-a-half standard deviations from the coefficients in the original early attrition specification. The DEP variable has an insignificant coefficient in the separation equation for enlistees after likely disqualifications are deleted.

How are the early attrition results influenced by self-selection associated with DEP losses? The results are virtually unchanged, both before and after controlling for the likely disqualification of low AFQT seniors who do not graduate.[15] DEP losses are sufficiently large to offset the lower early attrition losses of DEP accessions relative to non-DEP accessions (direct ships). On net, the separation rate of enlistees before they complete six months of active service is unaffected by DEP participation.

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[14]This regression is reported in appendix Table C.1. Exclusion of all seniors in AFQT categories 3b to 5 is obviously an imperfect way to adjust for the disqualification of low AFQT seniors who do not graduate. The adjustment presumably overstates disqualifications from this group because some of these recruits receive voluntary discharges from DEP.

[15]Although similar to the coefficients in the early attrition equation, the coefficients for mother's education and first choice service are significant in the specification combining early attrition and DEP losses adjusted for disqualifications. The likelihood of separation between enlistment day and six months of active service is inversely related to both socioeconomic status (as measured by mother's education) and enlistment in a recruit's preferred service. The significance of these variables should be treated cautiously, however, because the coefficients are insignificant before adjusting for possible disqualifications and because this adjustment may not be very accurate.

Alternatives to Military

The job matching model predicts that individuals who expect attrition to be relatively difficult are more circumspect about their enlistment decision. As a result, these recruits are less likely to be poorly matched with the military and are consequently lower attrition risks. The coefficient on attrition difficulty in Table 4.7 supports this notion. but the effect is insignificant.

The alternative job prospects of a recruit, should he decide to leave the service early, are likely to influence attrition. If he perceives great difficulty in finding a job, fears getting a low civilian wage, or has little pre-enlistment location-specific human capital, then his civilian alternatives are not attractive and separation is less likely. These alternative choice variables all have statistically insignificant effects on early attrition.

Socioeconomic Variables

The socioeconomic background of individuals before enlistment may provide some insight into unmeasured aspects of ability and adaptability brought along to the military. The predicted impact of these variables is ambiguous. Youths from more privileged homes may find better job matches by using family income to finance job search. As a result, these youths may have better job skills or may be better matched to the military, so the matching hypothesis predicts a negative relationship between socioeconomic status and early attrition. On the

Table 4.7

INFLUENCE OF MILITARY ALTERNATIVES
ON EARLY ATTRITION
(t-statistics in parentheses)

Characteristic	Percentage Change	
Attrition difficulty	-0.42	(-1.25)
Civilian wage	-0.41	(-1.64)
Not return to home area	-0.05	(-0.06)
Difficult to find job	-0.10	(-0.20)

other hand, disadvantaged youths may have worse alternatives if they become disenchanted with the military because of limited family resources to finance education or a spell of unemployment. This reasoning suggests that youths from disadvantaged families are less likely to separate than those from more privileged families.

Table 4.8 shows that the main socioeconomic variable of consequence for early attrition is the number of siblings. Mother's education has an insignificant effect on early attrition. In a prior regression run, family income was also included in the multivariate model, but the variable had an insignificant coefficient. Recruits from large families may have lower attrition than those from small families because they have fewer opportunities to finance an education or a job search if they leave the military early. Alternatively, those from large families may more easily become part of a group than those from small families.

SERVICE DIFFERENCES IN EARLY ATTRITION BEHAVIOR

Do the determinants of early attrition vary by service? In a strict statistical sense, the answer is yes. The F-statistic for pooling across services (with separate intercept terms for each service) was 1.598 with 168 and 8457 degrees of freedom, which is significant at the 99 percent level. Nonetheless, the effects of most variables on early attrition are qualitatively very similar in all service branches (see appendix Table

Table 4.8

INFLUENCE OF SOCIOECONOMIC VARIABLES
ON EARLY ATTRITION
(t-statistics in parentheses)

Characteristic	Percentage Change
No. of siblings	-0.42* (-2.64)
Mother's education	-1.65 (-1.47)

NOTE: Starred entry is based on discriminant coefficients in appendix Table B.2 that differ significantly from zero at the 5 percent level.

B.2).[16] Table 4.9 shows the contributions of demographic variables to
early attrition by service and overall. Results are given in Table 4.10
for prior experience, job match and satisfaction variables, entry point
decisions, alternatives to the military, and socioeconomic variables.

Table 4.9

INFLUENCE OF DEMOGRAPHIC CHARACTERISTICS ON
EARLY ATTRITION BY SERVICE AND OVERALL

Characteristic	Army	Navy	Air Force	Marines	Overall
Service					
Army, combat	-2.26				-1.17
Navy					3.10*
Air Force					2.33*
Marines					3.49*
Age at enlistment	0.98*	1.73*	0.11	4.18*	1.12*
Education					
Not HS graduate	6.50*	12.49*	12.48*	12.68*	8.08*
GED	6.97*	7.14*	10.02*	2.06	7.55*
Some post HS	-3.40	-1.36	5.39	-11.15	-2.02
AFQT	-0.09*	-0.10*	-0.08*	-0.04	-0.08*
Race					
Black	-4.57*	-5.16	-4.17	-3.64	-4.08*
Hispanic	-4.15*	-3.54	-4.35	-4.69	-4.22*
Fall enlistment	-0.33	-0.53	0.93	3.13	0.25
Region of origin					
Northeast	1.44	-2.49	1.53	-0.33	0.81
North Central	3.88*	1.94	-1.50	3.61	2.57*
West	0.19	1.60	0.93	0.62	0.77

NOTES: Starred entries are based on discriminant coefficients
in appendix Table B.2 that differ significantly from zero at the 5
percent level. The reference categories are noncombat Army, high
school graduates, white non-Hispanics, and South.

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[16]The pooled military regression has more significant regression coefficients than the
individual service equations. This difference reflects the greater statistical efficiency
achieved through pooling, which yields smaller standard errors and greater statistical sig-
nificance.

While age has a positive effect on early attrition in all services, the size of the effect varies considerably.[17] In the Air Force, the effect is positive but insignificantly different from zero. The age effect is most dramatic in the Marines, where a 19-year-old recruit has an early attrition level 4.2 percentage points higher than an 18-year-old recruit. Age increases early attrition by about 1.0 and 1.7 percentage points per year for each year beyond age 17 in the Army and Navy, respectively.

Other demographic variables have more similar effects on early attrition in all services. AFQT has a weak but similar impact in each service. Race has a negative influence of similar magnitude service-wide, although the variable is significant only in the Army. High school graduates are markedly more likely to survive the first months than dropouts, but this variable has a slightly weaker influence in the Army. While non-high school graduates have early attrition rates 6.5 percentage points higher than graduates in the Army, non-high school graduates have early attrition rates about 12.5 percentage points higher than graduates in all other service branches. In each service but the Marines, GEDs have attrition behavior more comparable with non-high school graduates than high school graduates.

Nontraditional attrition variables available in the AFEES survey have a significant impact on early attrition, but they do not alter the relationship between traditional variables and attrition. In each service, the pattern of significant coefficients is identical for the complete specification and for a specification with only traditional demographic variables. In most cases, the coefficients for traditional variables in the complete specification are less than one standard deviation different from those in the shorter specification.[18] The insensitivity of traditional effects to a more complete specification means that these effects are not substantially biased by the omission of more detailed work history and background variables. The new information provides a better estimate of which individuals will leave the services, but it does not alter the influence of factors like education, age, and AFQT. The only exception occurs for early Navy attrition where the estimated age effect is nearly doubled when prior work experiences and other newly available variables are added to the traditional specifications.

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[17]An F-statistic was computed for each service equation to assess whether a quadratic specification of the age variable added significantly to the explanatory power of the equation. The F-statistic for the Army with (1,4092) degrees of freedom is 1.35, for the Navy with (1,1562) degrees of freedom is 0.62, for the Air Force with (1,1717) degrees of freedom is 3.39, and for the Marines with (1,1082) degrees of freedom is 0.21. Each F-statistic is insignificant at the 95 percent confidence level.

[18]The coefficients for the traditional demographic attrition specifications are reported in appendix Table B.3.

Table 4.10

INFLUENCE OF PRIOR EXPERIENCE, JOB MATCH AND SATISFACTION, ENTRY
POINT DECISIONS, ALTERNATIVES TO MILITARY, AND SOCIOECONOMIC
VARIABLES ON EARLY ATTRITION BY SERVICE AND OVERALL

Characteristic	Army	Navy	Air Force	Marines	Overall
Prior experience					
School enrollment					
Full time	0.19	-0.58	0.08	0.43	-0.33
Part time	-5.02	0.59	6.27	-2.58	-1.23
Work history					
Currently employed	-0.13	-0.36	0.91	0.94	-0.12
Never Worked	6.60*	0.27	4.86	-2.91	3.34*
No. of employers	1.73*	-0.61	1.49*	0.23	1.08*
Unemployed last year	-0.41	4.23*	5.05*	4.09	2.17*
Job match and satisfaction					
Knew job qualified for	-0.63	-3.66	-3.03	4.15	-0.82
Counselor told best job	0.80	-1.12	2.08	-0.10	0.77
Not qualified for job	0 46	-1.18	-5.31*	5.86	0.01
Job not available	-2.48*	-0.01	2.22	3.75	-0.26
Not expected job	1.83	-1.78	3.37*	-0.51	1.29
Indifferent to job	2.1.	5.82	-2.53	3.52	2.40*
Job satisfaction	-0.06	-1.76	0.74	1.64	0.21
Overall satisfaction	0.42	0.06	-0.94	1.12	0.18
Entry point decisions					
Delayed Entry Program	-0.11	-1.10	-3.42	-2.21	-1.67*
Guaranteed location	-0.33	4.29*	0.99	3.03	0.83
Desirable location	-1.98	1.14	-0.20	1.82	-0.76
First-choice service	-1.10	1.93	-6.12	-4.20	-1.38
Alternatives to military					
Attrition difficulty	-1.42*	0.31	0.98	0.12	-0.42
Civilian wage	0.12	-0.77	-0.37	-1.34	-0.41
Not return to home area	0.42	0.28	0.35	-2.42	-0.05
Difficult to find job	-0.51	0.59	-0.06	1.27	-0.10
Socioeconomic variables					
No. of siblings	-0.64*	-0.29	-0.37	0.32	-0.42*
Mother's education	-2.01	-1.44	-1.16	-4.14	-1.65

NOTES: Starred entries are based on discriminant coefficients in
appendix Table B.2 that differ significantly from zero at the 5 percent
percent level. The reference categories are non-combat Army, high
school graduates, white non-Hispanics, and South. The percentage change
in early attrition associated with a change in the number of employers
is evaluated at age 19.

Prior experience influences are qualitatively similar across services. School enrollment has a uniformly insignificant effect on early attrition after controlling for other variables in the multivariate model. Differences in work history before enlistment are significant predictors of early attrition in the Army, Navy, and Air Force. Either the number of previous employers or unemployment history or both have the expected qualitative impact on early attrition in these services. Navy and Air Force recruits with a spell of unemployment in the year preceding enlistment are 4 to 5 percentage points more likely to be mismatched and leave during the first six months. An extra job change for a 19-year-old recruit in the Army or Air Force enhances his chances of early separation by 1.7 and 1.5 percentage points, respectively.

How does the importance of age and work history compare with high school graduation status in predicting early attrition? Figure 4.2 illustrates the estimated attrition rate by graduation status and service for the two representative types of recruits. As for the services combined, 17-year-old recruits with a stable employment pattern are less attrition-prone than 20-year-old recruits with a pattern of employment instability. Among high school graduates in each service, the younger recruits have predicted separation rates 5 to 13 percentage points lower than the older group with less stable work histories. In the Army and Marines, young nongraduates with stable employment have estimated attrition percentages *lower* than older graduates with a pattern of civilian job instability. The illustration demonstrates that age and work history information substantially improves early attrition predictions based on graduation status alone.[19]

As in the overall military equation, the job match characteristics are virtually all insignificant. Two of the three significant coefficients do not have the expected sign. In the Air Force, recruits who are *not* qualified for the job they desire are *less* likely to leave during the first six months than those who are qualified. Similarly, in the Army, recruits whose desired job is not available are *less* likely to leave early. One significant service job match coefficient has the expected sign: Air Force recruits who do not get the jobs they expect are 3.4 percentage

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[19]The same illustration groups are used for each service to aid comparisons. As mentioned above, the age, number of employers, and unemployment variables are not significant in each service. The Army percentages in Fig. 4.2a reflect an insignificant coefficient on unemployment last year. The Navy percentages in Fig. 4.2b are insensitive to changes in the number of previous employers. Age effects do not contribute significantly to the predicted Air Force attrition percentages in Fig. 4.2c. The age and employment stability variables in the Marines are dominated by a large and significant age effect. The figure shows how the predicted attrition percentages vary for different groups of recruits. The partial effect of a single characteristic is provided in Tables 4.9 and 4.10.
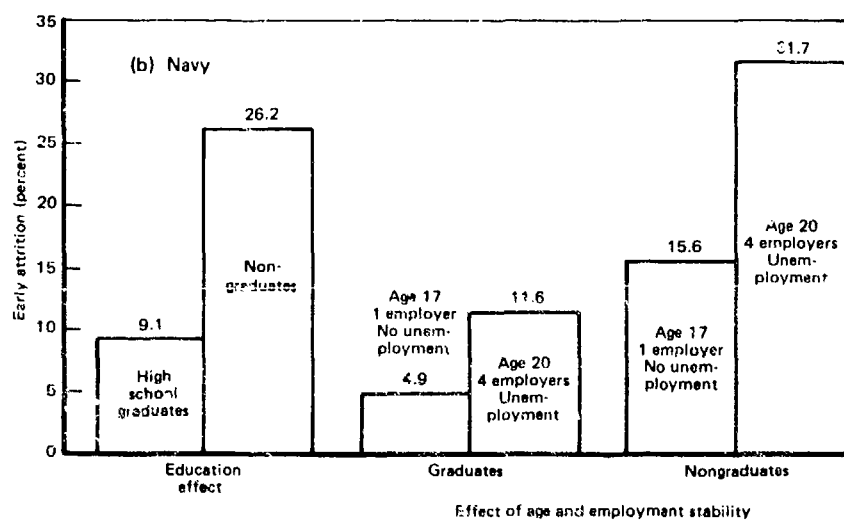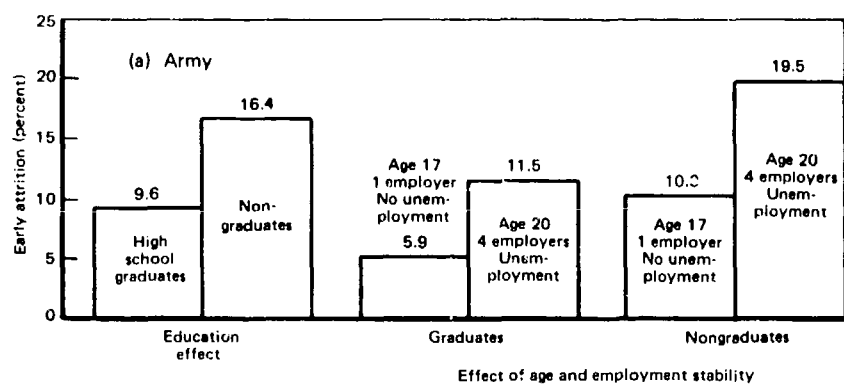
Fig. 4.2—Early attrition predictions differ by age and employment stability in addition to graduation status in each service

Fig. 4.2—continued

(c) Air Force

(d) Marines
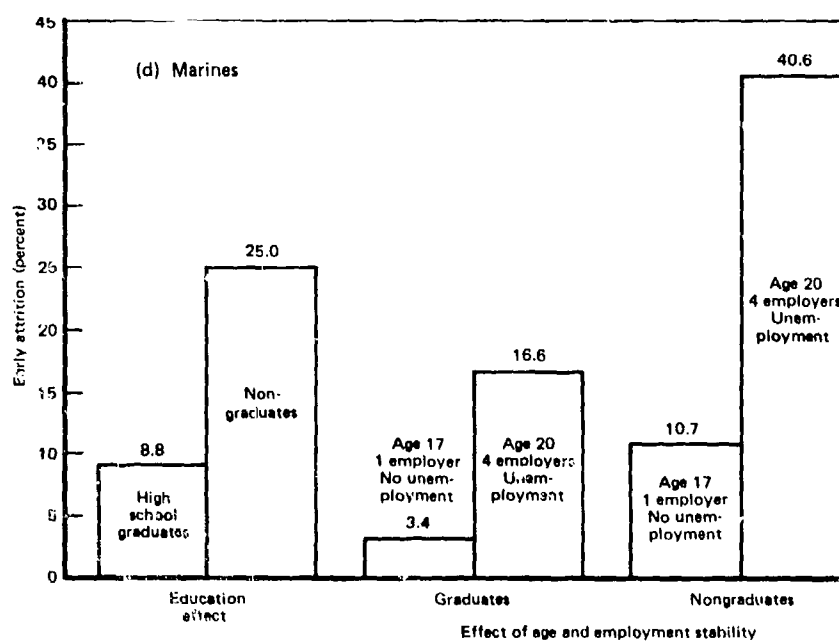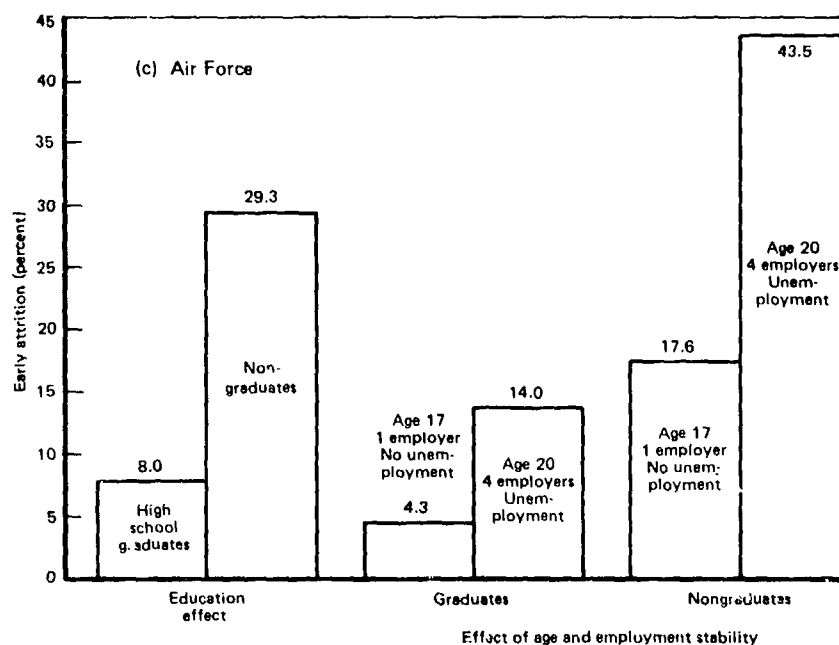
points more likely to leave during the first six months than recruits who do get their expected jobs.

Neither job satisfaction nor overall satisfaction has a significant impact on early attrition in any service branch. Although satisfaction variables are important in studies of civilian separations, initial satisfaction with the military is not a requirement for completion of the first six months in the service.

Most entry point decisions have little effect on early attrition. DEP has a negative effect on separations in all services, but the DEP coefficient is statistically significant only in the pooled military equation. The coefficients for desirable location and first choice service are not significant in any regression specification. Recruits with guaranteed post-training location assignments in the Navy are *more* likely than others to leave during the first six months. I had expected that the greater certainty of a desirable future outcome would (other things equal) reduce the likelihood of separation.

With one exception, the coefficients for all military alternative variables are insignificant, but the exception is worth noting. In the Army, the likelihood of early attrition is directly related to the perceived ease of attrition on enlistment day. Other things equal, the estimated effect implies that recruits who believe that attrition is almost impossible are 1.4 percentage points less likely to separate than those who believe that attrition is very difficult. The predicted gap between the early attrition rate of those who believe attrition is almost impossible and those who believe that it is easy is over 7 percentage points. For the Army then, the perceived ease of attrition does have the effect anticipated from the analytical framework of Sec. II.

Socioeconomic variables have little impact on early attrition. Army recruits from big families are significantly less likely to leave early, but the size of the effect is small. Apparently, Army recruits with siblings have less difficulty making the initial transition into the military.

COMPARISON WITH PREVIOUS ATTRITION RESULTS

Previous attrition studies (Sinaiko et al., 1981, and references therein) have focused on military separations over a three-year period and have not addressed attrition timing.[20] If the factors influencing attrition had proportional effects throughout the first term, then the early attrition results found here should closely correspond with results from comparable studies of attrition over the entire first term.

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[20]Two exceptions to this pattern are post-training attrition analysis in the Army and Air Force (Buddin, 1981) and survival function analysis in the Navy (Lurie, 1979).

Alternatively, certain variables may have different effects on attrition at different times in the enlistment term. Since basic training and specialty training consume nearly all of the first six months, the nature of separation behavior during this initial transition and training phase may differ substantially from separation behavior later in the term when individuals are assigned and working in a military specialty.

The analytic framework developed in Sec. II suggests that new job matches are particularly vulnerable: Individuals quickly acquire new information about the job attributes, and employers rapidly obtain new insight into worker productivity and reliability. This new information facilitates a reevaluation of the employment contract by both parties and possible separation of mismatched workers. Initial mismatches and early attrition may be less likely for individuals with some attributes (e.g., education, work experience), but subsequent separation behavior may hinge on the compatibility of these attributes with firm-specific human capital investment. As a result, the analytic framework is consistent with the notion that the effect of a variable may differ over the course of the enlistment term.

Comparisons with previous attrition studies are complicated by differences in model specification. Although virtually all studies include basic demographic variables, most other types of variables in the multivariate early attrition model have not been included in previous studies. For example, prior work experience influences early attrition, but full-term attrition studies have not included these types of variables in their analysis.[21] Job satisfaction, on the other hand, has no impact on early attrition, but initial satisfaction may have some influence on attrition later in the term. Comparisons cannot be made for job satisfaction, because previous studies have not examined the variable.

Demographic variables provide the main basis for comparing the early attrition results with those of previous studies. Even these comparisons, however, are perilous, because omission of relevant information on prior work history and job satisfaction, for example, may bias the estimated effects of demographic variables.[22] Assuming this bias is small, a comparison of demographic effects on early attrition and on attrition over the entire term will reveal whether separation behavior during this initial phase is fundamentally different from that found later in the term.

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[21]The databases developed in most previous attrition studies used personnel files, which include only demographic information on individuals entering the services.

[22]This omitted variable bias is small for early attrition, but it may be more important later in the first term.

The most important demographic variable in this context is age. Early attrition is directly related to recruit age in the Army, Navy, and Marines. Past Army and Navy studies indicate that younger recruits are more separation-prone over the entire term as well as after completion of specialty training. In previous research (Buddin, 1981), I found that post-training attrition rates for 17-year-old Army enlistees were significantly higher than for older enlistees. Among Army non-high school graduates, Blandin and Morris (1982) estimated lower attrition rates for 18-year-old enlistees than either younger or older recruits over the entire first term. Navy studies (Lockman, 1978; Kendall and Smith, 1980; Warner, 1981) have found that 18-year-old recruits complete their terms more frequently than either younger or older recruits. The insignificant effect of age on early Air Force attrition is consistent with the generally weak and insignificant age effects on post-training attrition (Buddin, 1981).

The apparent different impacts of age on early and late attrition have implications for Army and Navy accession policy. If young recruits separate late in the term and old recruits separate early, then accession screens based on three-year attrition profiles may distort recruiting and training efforts. The costs associated with the loss of a 17- and 20-year-old recruit are not equal if the 17-year-old separates after 30 months and the 20-year-old separates after 5 months. In the former case, the costs of training and recruiting are recouped, but in the latter case they are not. Nonetheless, further research is needed to systematically assess whether age has radically different effects on early and late attrition in the Army and Navy.[23]

The race effect on early attrition differs only slightly from the race effect on attrition later in the term. The only significant race effects on early attrition are in the Army where blacks and Hispanics are about 4 percent less likely to separate during the first six months than white non-Hispanics. Other studies of post-training (Buddin, 1981) and full-term attrition (Blandin and Morris, 1982) report insignificant effects of race on attrition in the Army. Several Navy studies (Lockman, 1978; Kendall and Smith, 1980; Warner, 1981) have reported that whites are more likely to leave early during the first term. Race has an insignificant effect on early attrition from the Navy, but the difference between this result and prior results may simply reflect the larger

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[23]Some of the differences between age effects on early attrition and later attrition may reflect differences in model specification or cohort effects, i.e., individuals in the 1974 cohort analyzed by Lockman (1978) may respond differently to the military than individuals with similar characteristics in the 1979 AFEES survey. A more direct comparison of the determinants of early and late attrition is possible with the AFEES survey, but this task was not part of the current research.

sample sizes of previous studies.[24] Race has an insignificant effect on early Air Force attrition, and this result is consistent with previous analysis of post-training Air Force attrition (Buddin, 1981).[25] Previous attrition studies have not controlled for Hispanic status.[26]

The effects of education and AFQT on early attrition are similar to those of previous research on full-term or post-training attrition. Researchers have consistently found that high school graduates are much more likely to complete their first term than nongraduates. This result also holds for early attrition, and the rough 2:1 ratio of high school graduate attrition to non-high school graduate attrition also holds. The small negative effect of AFQT on early attrition is consistent with the relationship between AFQT and full-term or post-training attrition (Buddin, 1981; Kendall and Smith, 1980).

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[24]Blacks have lower early attrition rates than whites, but the t-statistic for the black coefficient reported in appendix Table A.2 is 1.82.

[25]Like the black coefficient in the Navy equation, the black coefficient in the early Air Force attrition equation is "nearly" significant with a t-statistic of 1.94.

[26]A comparison of self-reported and service-reported race/ethnicity was possible by comparing AFEES survey responses and service categorizations on DMDC personnel files. In the case of Hispanics, discrepancies were frequent. Personnel files define Hispanics as individuals with Spanish surnames. About 30 percent of those classified as Hispanics on their personnel files did not characterize themselves as Hispanics, and over 50 percent of those who classified themselves as Hispanics were not classified as Hispanics on DMDC personnel files. The Hispanic variable used in this study is based on the self-reported ethnicity variable on the AFEES survey.

V. SUMMARY AND CONCLUSIONS

In this research, a multivariate model of the early attrition process was used to assess the contribution of demographic background, prior experience, job match and satisfaction, entry point decisions, alternatives to the military, and socioeconomic variables to early attrition. The analysis framework is based on recent firm-specific human capital and job matching models of job separations. Comparisons are drawn between the determinants of early attrition and civilian job separations of young workers, and the effects of various variables are also compared across services. Finally, this research relates the analysis of early attrition to previous research on post-training attrition and attrition over the entire first term.

Perhaps the most surprising result is that younger recruits are much less likely than older recruits to separate during the first six months of service. Although early attrition does not vary significantly by age in the Air Force, it increases about 1, 2, and 4 percentage points per year with enlistment age beyond 17 in the Army, Navy, and Marines, respectively. This finding is at odds with the prediction from our analysis framework, the relationship between civilian separations and age, and previous attrition findings. Differing age effects on military and civilian separations suggest that older enlistees may be labor market "misfits" who do worse in the military than one would expect even after controlling for their previous work history. Differing age effects on early and full-term or post-training attrition suggest that young recruits are more likely to complete the first six months than the average recruit but less likely to subsequently finish the term. A complete analysis of *why* age has a different impact on early attrition than on civilian separations or post-training attrition requires additional data, e.g., about training practices, the implementation of attrition policy, and the enlistment decisions of older versus younger enlistees.

For all services, not having a high school diploma is a major determinant of early attrition. Although this result is fully consistent with prior attrition research, the richness of the AFEES database allows for an accounting of many previously unobserved variables (like work history or poor job matches) that might have distorted the impact of high school graduation status on attrition. Some of these new variables had significance in explaining early attrition, but they did not diminish either the size or significance of the education effect on attrition.

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This research demonstrates that individual work history and experience have an important bearing on early attrition. Individuals with no prior employment experience have early attrition rates over 3 percentage points higher than those with some experience. Frequent job changers in the civilian sector also have high separation rates in the military. A recent spell of unemployment before enlistment is associated with a 4 to 5 percentage point increase in the likelihood of Navy and Air Force early attrition.

Various indicators of military job match had no significant impact on early attrition. Specific aspects of the match—like not qualifying for the desired kind of job and pre-enlistment knowledge of job qualifications—did not alter the likelihood of early attrition after controlling for other variables in the multivariate model. More general measures of match quality, like job satisfaction and overall satisfaction, also had insignificant influences on early attrition. Recruits whose interests are redirected into unexpected or less desired occupations because of aptitude or service requirements are no more attrition-prone than those who get their first occupational choice.

How do the determinants of early attrition and civilian separations of young workers compare? Work history, general aptitude, and minority status have similar impacts in both types of separations. Three important variables have quite different effects. Age is directly related to early attrition and inversely related to civilian separations. Education has a significant and more pronounced impact on early attrition than on civilian separations. Finally, job dissatisfaction is consistently linked with civilian separation, but differences in job satisfaction on enlistment day have no significant impact on the likelihood of early separation. These differences between the determinants of early attrition and civilian separations of young workers may reflect both institutional differences between the two sectors and differences in the individuals who choose employment in each.

Appendix A

STATISTICAL METHODOLOGY

The results reported in Sec. IV are based on a logistic regression model that was applied to test the hypotheses of Sec. II and evaluate the separate effects of individual factors to the overall early attrition level. Let P_i equal the probability of attrition during the first six months of service for the ith recruit. P_i is a function of a vector of explanatory variables X_i, which influence attrition. The underlying probability is not observed, however, and only the outcome Y_i is observed. Y_i is defined as one or zero depending on whether the individual is discharged during the first six months or not. Least squares regression estimation is not appropriate in this instance because the dependent variable has a Bernoulli distribution. As a result, the variance of Y_i is a function of the expected Y_i, and the predicted values of Y_i are not bounded by zero and one. These problems are avoided by estimation of the logistic functional form, where

$$Prob[Y_i = 1|X_i] = 1 / [1 + exp(-X_i \beta)] \tag{4}$$

represents the probability that the ith individual with characteristics X_i will be discharged during the first six months of service. In this equation, X_i is a $1 \times (k + 1)$ vector, β is a $(k + 1) \times 1$ vector of estimated parameters, and k denotes the number of estimated individual characteristics.

The logistic model is easily transformed into a linear discriminant function where

$$\lambda(X) = \ell n [Prob(X) / (1 - Prob(X))] = X\beta, \tag{5}$$

i.e., the natural logarithm of the odds ratio is a linear function of X. The estimated coefficients are computed by rescaling the least squares coefficients from the regression relating Y and X (Haggstrom, 1982). The effect of the jth characteristic on Y is more intuitively explained in terms of the derivative of the probability with respect to X_j. For the logistic function, this derivative equals

$$\beta_j P'(1 - P'), \qquad\qquad (6)$$

where the derivative is evaluated at some given probability (P') of early attrition. One likely candidate for P' is the mean early attrition rate for the regression group. This derivative approximates the contribution of a given variable on the average probability of early attrition while holding constant other X variables.

Appendix B

VARIABLE DEFINITIONS AND REGRESSION RESULTS

Table B.1

DEFINITIONS OF DISCRIMINANT VARIABLES

Variable Name	Variable (Indicator) Definition
Demographics	
Service	
Army, noncombat[a]	Enlisted in Army noncombat occupation
Army, combat	Enlisted in Army combat occupation
Navy	Enlisted in Navy
Air Force	Enlisted in Air Force
Marines	Enlisted in Marines
Age at enlistment	Age at enlistment in years and twelfths of of years
Education	
Not HS graduate	Not high school graduate at accession
GED	General Educational Development Certificate
High school diploma[a]	High school graduate at accession
Some post HS	Some education beyond high school at accession
AFQT	Armed Forces Qualification Test Percentile
Delayed Entry Program	Accession after participation in DEP
Race	
Black	Black
Hispanic	Hispanic (self-reported ethnicity from AFEES Survey)
White[a]	White
Fall enlistment	Enlisted during fall wave of AFEES survey
Region of origin	
Northeast	Census Division - Northeast
North Central	Census Division - North Central
South[a]	Census Division - South
West	Census Division - West

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Table B.1—continued

Variable Name	Variable (Indicator) Definition
Prior experience	
School enrollment	
Full time	Enrolled full time at time of enlistment
Part time	Enrolled part time at time of enlistment
Nonstudent[a]	Not enrolled at time of enlistment
Work history	
Currently employed	Employed at time of enlistment
Never worked	Not employed before enlistment
No. of employers	Number of previous employers
Unemployed last year	Unemployed during some month of previous year
Job match and satisfaction	
Knew job qualified for	Knew job qualified for before enlistment day
Counselor told best job	Counselor advised which job was best for for individual
Not qualified for job	Individual did not qualify for kind of job desired
Job not available	Desired job was not available at the desired time
Not expected job	Job assignment was different than expected
Indifferent to job	Specific job assignment does not matter
Job satisfaction	Five point scale of satisfaction with specific military job assignment (1= very dissatisfied, ..., 5=very satisfied)
Overall satisfaction	Seven point scale of anticipated overall military satisfaction (1=very dissatisfied, ..., 7=very satisfied)
Entry point decisions	
Guaranteed location	Post-training location assignment is guaranteed at time of enlistment
Desirable location	Expected post-training location assignment is the same as most desired location (locations defined as base overseas, at sea, base within 100 miles of home, base 100-500 miles from home, base more than 500 miles from home)
First-choice service	Service of accession is the individual's first choice
Alternatives to military	
Attrition difficulty	Perceived difficulty of leaving before the end of enlistment period, five point scale variable (1=very easy, ..., 5= almost impossible
Civilian wage	Civilian wage before enlistment

Table B.1—continued

Variable Name	Variable (Indicator) Definition
Not return to home area	Individual does not plan to return to home area after leaving military
Difficult to find job	Perceived difficulty of finding job in home area at time of enlistment, four point scale (1=not difficult at all, ..., 4=almost impossible)

Socioeconomic variables

No. of siblings	Number of siblings
Mother's education	Mother's education beyond high school

[a]Omitted category used as reference group in regressions.

Table B.2

DISCRIMINANT REGRESSION COEFFICIENTS FOR EARLY ATTRITION BY SERVICE AND FOR ALL SERVICES COMBINED

(Standard errors in parentheses)

Characteristic	Army	Navy	Air Force	Marines	Overall
Demographics					
Service					
Army, combat	-0.21327				-0.11863
	(0.10953)				(0.10349)
Navy					0.31257*
					(0.11713)
Air Force					0.23448*
					(0.11619)
Marines					0.35222*
					(0.12925)
Age at enlistment	0.10900*	0.34772*	0.07685	0.51026*	0.17153*
	(0.05102)	(0.11494)	(0.14064)	(0.14785)	(0.04132)
Education					
Not HS graduate	0.61354*	1.2650*	1.5556*	1.2329*	0.81425*
	(0.11391)	(0.24315)	(0.37853)	(0.27037)	(0.09014)
GED	0.65775*	0.72251*	1.2492*	0.20063	0.76116*
	(0.20549)	(0.30902)	(0.30378)	(0.60356)	(0.13755)
Some post HS	-0.32023	-0.13808	0.67097	-1.0758	-0.20338
	(0.32114)	(0.38332)	(0.53771)	(0.78050)	(0.20535)
AFQT	-0.00892*	-0.00989*	-0.01015*	-0.00421	-0.00834*
	(0.00274)	(0.00427)	(0.00480)	(0.00532)	(0.00185)
Delayed Entry Program	-0.00993	-0.11186	-0.42662	-0.21324	-0.16840*
	(0.1 316)	(0.19634)	(0.22000)	(0.25347)	(0.08067)
Race					
Black	-0.43135*	-0.52218	-0.51963	-0.35414	-0.41099*
	(0.12774)	(0.28661)	(0.26752)	(0.28117)	(0.09629)
Hispanic	-0.39158*	-0.35875	-0.54168	-0.45578	-0.42561*
	(0.18321)	(0.41610)	(0.44952)	(0.36822)	(0.13970)
Fall enlistment	-0.03073	-0.05466	0.11647	0.30408	0.02530
	(0.11035)	(0.18443)	(0.20331)	(0.22821)	(0.07696)
Region of origin					
Northeast	0.13542	-0.25173	0.19028	-0.03180	0.08167
	(0.14823)	(0.24537)	(0.24324)	(0.29597)	(0.10062)

Table B.2—continued

Characteristic	Army	Navy	Air Force	Marines	Overall
North Central	0.36606*	0.19631	-0.18723	0.35092	0.25957*
	(0.13172)	(0.22358)	(0.24904)	(0.27233)	(0.09312)
West	0.01810	0.16167	0.11531	0.06006	0.07732
	(0.14793)	(0.24726)	(0.25534)	(0.32229)	(0.10308)

Prior experience

School enrollment

Full time	0.01771	-0.05832	0.00994	0.04181	-0.03320
	(0.14601)	(0.24540)	(0.26434)	(0.28717)	(0.10000)
Part time	-0.47320	0.05977	0.78195	-0.25100	-0.12397
	(0.28111)	(0.46499)	(0.49368)	(0.49299)	(0.18987)

Work history

Currently employed	-0.01186	-0.03597	0.11339	0.09155	-0.01260
	(0.13477)	(0.20460)	(0.21802)	(0.24746)	(0.08847)
Never Worked	0.62228*	0.02746	0.60575	-0.28336	0.33673*
	(0.23300)	(0.42314)	(0.47591)	(0.46217)	(0.16788)
No. of employers	0.27454	1.0810*	0.60785	0.81294	0.50816*
	(0.26904)	(0.53483)	(0.68691)	(0.75631)	(0.20952)
Unemployed last year	-0.03880	0.42814*	0.62911*	0.39791	0.21834*
	(0.11104)	(0.18946)	(0.19876)	(0.22554)	(0.07776)
Age × No. of employers	-0.00586	-0.06016*	-0.02221	-0.04160	-0.02100*
	(0.01354)	(0.02754)	(0.03518)	(0.03940)	(0.01666)

Job match and satisfaction

Knew job qualified for	-0.05970	-0.37007	-0.37751	0.40398	-0.08312
	(0.10601)	(0.18946)	(0.21075)	(0.21786)	(0.07632)
Counselor told best job	0.07544	-0.11385	0.25898	-0.00933	0.07731
	(0.10747)	(0.18080)	(0.18373)	(0.23453)	(0.07481)
Not qualified for job	0.04304	-0.11996	-0.66123*	0.56956	0.00064
	(0.13283)	(0.24644)	(0.29450)	(0.33358)	(0.10055)
Job not available	-0.23429*	-0.00105	0.27663	0.36445	-0.02585
	(0.10419)	(0.18060)	(0.18807)	(0.23689)	(0.07416)
Not expected job	0.17307	-0.17881	0.41991*	-0.04936	0.12999
	(0.11738)	(0.21198)	(0.21352)	(0.28297)	(0.08482)
Indifferent to job	0.20469	0.58932	-0.31589	0.34257	0.23933*
	(0.14353)	(0.32231)	(0.39482)	(0.30188)	(0.11262)
Job satisfaction	-0.00550	-0.17813	0.09191	0.15969	0.02097
	(0.07197)	(0.13406)	(0.13519)	(0.13093)	(0.05057)
Overall satisfaction	0.03949	0.00612	-0.11765	0.10877	0.01817
	(0.04390)	(0.00795)	(0.08074)	(0.08534)	(0.03103)

Table B.2—continued

Characteristic	Army	Navy	Air Force	Marines	Overall
Entry point decisions					
Guaranteed location	-0.03126	0.43462*	0.12399	0.29445	0.08344
	(0.11462)	(0.21536)	(0.24564)	(0.31971)	(0.08665)
Desirable location	-0.18662	0.11640	-0.02554	0.17722	-0.07647
	(0.12709)	(0.23710)	(0.20544)	(0.25002)	(0.08792)
First-choice service	-0.10344	0.19521	-0.76266	-0.40824	-0.13944
	(0.13053)	(0.34336)	(0.82070)	(0.45932)	(0.11602)
Alternatives to military					
Attrition difficulty	-0.13422*	0.03090	0.12212	0.01205	-0.04276
	(0.04732)	(0.08474)	(0.09050)	(0.10277)	(0.03417)
Civilian wage	0.01106	-0.07814	-0.04601	-0.13038	-0.04104
	(0.03488)	(0.06324)	(0.06741)	(0.07090)	(0.02505)
Not return to home area	0.03999	0.02800	0.04423	-0.23524	-0.00535
	(0.12102)	(0.19467)	(0.20247)	(0.24452)	(0.08264)
Difficult to find job	-0.04831	0.06010	-0.00765	0.12315	-0.01010
	(0.07967)	(0.12734)	(0.12887)	(0.14949)	(0.05033)
Socioeconomic variables					
No. of siblings	-0.06072*	-0.02924	-0.04643	0.03125	-0.04253*
	(0.02252)	(0.04024)	(0.04350)	(0.04565)	(0.01611)
Mother's education	-0.18914	-0.14576	-0.14515	-0.40291	-0.16602
	(0.18206)	(0.24919)	(0.24841)	(0.33626)	(0.11281)
Constant	-3.7760	-7.6425	-3.4500	-13.677	-5.4711
	(1.1316)	(2.4543)	(2.9781)	(3.0727)	(0.89389)
F-statistic	3.2516	2.6310	2.2717	2.4504	5.5555
Sample size	4152	1621	1776	1141	8690
Attrition rate after six months	.1206	.1111	.0880	.1164	.1116

NOTES: A modified zero-order regression method was used to account for missing values in each equation. Indicator variables were defined and included for all variables except service, age, education, AFQT, delayed entry, fall enlistment status, and region of origin. These variables did not have any missing observations in the sample.

Starred entries differ significantly from zero at the 5 percent level.

Table B.3

DISCRIMINANT REGRESSION COEFFICIENTS FOR EARLY ATTRITION FOR ALL SERVICES COMBINED: DEMOGRAPHIC VARIABLE SPECIFICATION

Characteristic	Army	Navy	Air Force	Marines	Overall
Service					
Army, combat	-0.17144				-0.06856
Navy					0.22596*
Air Force					0.12751
Marines					0.27560*
Age at enlistment	0.10262*	0.08514*	0.02483	0.33544*	0.10835*
Education					
Not HS graduate	0.62167*	1.3779 *	1.5085 *	1.1711 *	0.87256*
GED	0.65938*	0.77501*	1.2728 *	0.14490	0.80282*
Some post HS	-0.29525	-0.21553	0.66392	-1.3559	-0.23619
AFQT	-0.01033*	-0.01483*	-0.00993*	-0.00754	-0.01052*
Delayed Entry Program	-0.14596	-0.18269	-0.38437*	-0.20888	-0.21176*
Race					
Black	-0.45684*	-0.31476	-0.46283	-0.27720	-0.40583*
Hispanic	-0.39279*	-0.13168	-0.50821	-0.35925	-0.37610*
Fall enlistment	-0.01325	-0.15060	0.07247	0.32317	0.01617
Region of origin					
Northeast	0.09161	-0.22587	0.14201	0.18037	0.04810
North Central	0.31202*	0.20197	-0.09058	0.34747	0.23176*
West	0.00391	0.17348	0.15917	0.06557	0.06064
Constant	-3.7562 *	-3.1457 *	-2.3418 *	-8.5489 *	-4.0007 *
F-statistic	7.9058	5.8357	4.7552	5.4607	15.529

NOTE: Starred entries differ significantly from zero at the 5 percent level.

Table B.4

DISCRIMINANT REGRESSION RESULTS FOR CIVILIAN JOB SEPARATIONS OF 17- TO 22-YEAR-OLD MALES BETWEEN 1979 AND 1980

Explanatory Variable	Coefficient	Standard Error
Constant	4.0083	1.2691
Age	-0.14096*	0.06086
Highest grade completed	-0.04166	0.07679
East	-0.51421*	0.20621
North Central	-0.25733	0.18377
West	0.16871	0.21270
Hispanic	-0.22280	0.23337
Black	-0.28866	0.20776
Tenure	-0.06256*	0.00979
Tenure squared	0.00048*	0.00012
AFQT	-0.00391	0.00334
F-statistic	6.1980	
Sample size	914	
Separation rate after one year	.41190	

NOTES: The sample excludes full-time students and individuals not employed on the the survey date in 1979. The reference category is white, non-Hispanics from the West. A modified zero-order regression method was used to account for missing values in the estimated equation. Indicator variables were defined for missing values of AFQT and tenure, but those coefficients are not reported here. Starred entries are significantly different from zero at the 5 percent level.

Appendix C

IMPLICATIONS OF DEP LOSSES FOR EARLY ATTRITION RESULTS

Table C.1

SENSITIVITY OF REGRESSION RESULTS
TO TREATMENT OF DEP LOSSES
(Standard errors in parentheses)

Characteristic	Early Attrition	Early Attrition and DEP Losses	Early Attrition and DEP Losses (except seniors cat 3b to 5)
Demographics			
Service			
Navy	0.31257*	0.24200*	0.24647*
	(0.11713)	(0.10017)	(0.10293)
Air Force	0.23448*	0.19731*	0.20342*
	(0.11619)	(0.10072)	(0.10341)
Marines	0.35222*	0.35249*	0.31856*
	(0.12925)	(0.11018)	(0.11358)
Age	0.17133*	0.12511*	0.15306*
	(0.04132)	(0.03524)	(0.03612)
Education			
Not HS graduate	0.81425*	0.69181*	0.76115*
	(0.09014)	(0.07926)	(0.08135)
GED	0.76116*	0.52874*	0.57899*
	(0.13754)	(0.12177)	(0.12460)
Some post HS	-0.20338	-0.04582	-0.07906
	(0.20535)	(0.17932)	(0.18379)
AFQT	-0.00834*	-0.00874*	-0.00596*
	(0.00185)	(0.00162)	(0.00167)
Delayed Entry Program	-0.16840*	0.02897*	-0.03525*
	(0.08067)	(0.13688)	(0.14013)
Race			
Black	-0.41099*	-0.44748*	-0.42595*
	(0.09629)	(0.08461)	(0.08703)
Hispanic	-0.42561*	-0.46135*	-0.43395*
	(0.13970)	(0.12276)	(0.12620)
Fall enlistment	0.02530	0.06410	0.02898
	(0.07696)	(0.06765)	(0.06950)

Table C.1.—continued

Characteristic	Early Attrition	Early Attrition and DEP Losses	Early Attrition and DEP Losses (except seniors cat 3b to 5)
Region of origin			
Northeast	0.08167	0.05398	0.07207
	(0.10062)	(0.08850)	(0.09091)
North Central	0.25957*	0.20178*	0.21904*
	(0.09312)	(0.08187)	(0.08413)
West	0.07732	0.15759	0.13622
	(0.10308)	(0.09028)	(0.09288)
Prior experience			
School enrollment			
Full time	-0.03319	0.18023*	-0.01903
	(0.10000)	(0.08802)	(0.09069)
Parttime	-0.12397	0.18979	-0.07418
	(0.18987)	(0.16395)	(0.17084)
Work history			
Currently employed	-0.01259	-0.03485	-0.01736
	(0.98847)	(0.07779)	(0.07988)
Never worked	0.33673*	0.43822*	0.36041*
	(0.16789)	(0.14754)	(0.15202)
No. of employers	0.50816*	0.33674*	0.43975*
	(0.20952)	(0.18344)	(0.18813)
Unemployed last year	0.21834*	0.15899*	0.15911*
	(0.07776)	(0.06842)	(0.07027)
Age × No. of employers	-0.02100*	-0.01025*	-0.01559*
	(0.01065)	(0.00941)	(0.00965)
Job match and satisfaction			
Knew job qualified for	-0.27982	-0.39662	-0.25020
	(0.45724)	(0.39905)	(0.41381)
Counselor told best job	-0.61583	-0.21074	-0.48036
	(0.39924)	(0.34857)	(0.36243)
Not qualified for job	0.38944	0.34737	0.30717
	(0.33266)	(0.29237)	(0.30097)
Job not available	-0.02585	-0.05192	-0.04780
	(0.07416)	(0.06524)	(0.06699)
Not expected job	0.12999	0.09075	0.11081
	(0.08482)	(0.07461)	(0.07663)
Indifferent to job	0.23933*	0.07548*	0.09881*
	(0.11263)	(0.09937)	(0.10210)
Job satisfaction	0.02097	-0.05795	-0.01920
	(0.05057)	(0.04421)	(0.04562)
Overall satisfaction	0.01817	0.01185	0.00546
	(0.03105)	(0.02727)	(0.02799)

Table C.1.—continued

Characteristic	Early Attrition	Early Attrition and DEP Losses	Early Attrition and DEP Losses (except seniors cat 3b to 5)
Entry point decisions			
Guaranteed location	0.08344	0.03144	0.01432
	(0.08665)	(0.07586)	(0.07795)
Desirable location	-0.07647	-0.07409	-0.06621
	(0.08792)	(0.07723)	(0.07933)
First-choice service	-0.13944	-0.17751	-0.21246*
	(0.11603)	(0.10148)	(0.10419)
Alternatives to military			
Attrition difficulty	-0.04276	-0.06064	-0.04699
	(0.03417)	(0.03002)	(0.03085)
Civilian wage	-0.04104	-0.01402	-0.02128
	(0.02505)	(0.02203)	(0.02260)
Not return to home area	-0.00535	0.02658	0.01261
	(0.08263)	(0.07262)	(0.07457)
Difficult to find job	-0.01010	-0.04924	-0.04983
	(0.05033)	(0.04424)	(0.04548)
Socioeconomic variables			
No. of siblings	-0.04253*	-0.02539*	-0.02804*
	(0.01611)	(0.01415)	(0.01454)
Mother's education	-0.16602	-0.15481	-0.21796*
	(0.11281)	(0.09922)	(0.10210)
Constant	-5.4711	-3.9574	-4.6680
F-statistic	5.5555	5.1479	5.4033
Sample size	8690	9020	8943

NOTES: Early attrition refers to discharges by active duty personnel in the first six months of service. DEP losses are those who enlist into the delayed entry program and separate before beginning active service. The first equation shows the effects of various variables on early attrition conditional on enlistment and accession (starting of active duty). The second equation is a comparable specification for all enlistees, where the dependent variable indicates a separation by the end of six months of active service, i.e., either early attrition or DEP loss. The final equation is like the second except that DEP losses by high school seniors in low AFQT categories are deleted, because many of these losses are believed to represent DEP disqualifications for nongraduation.

Starred entries differ significantly from zero at the 5 percent level.

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